AMERICAN GAS JOURNAL

NOVEMBER, 1938

DEC 1938

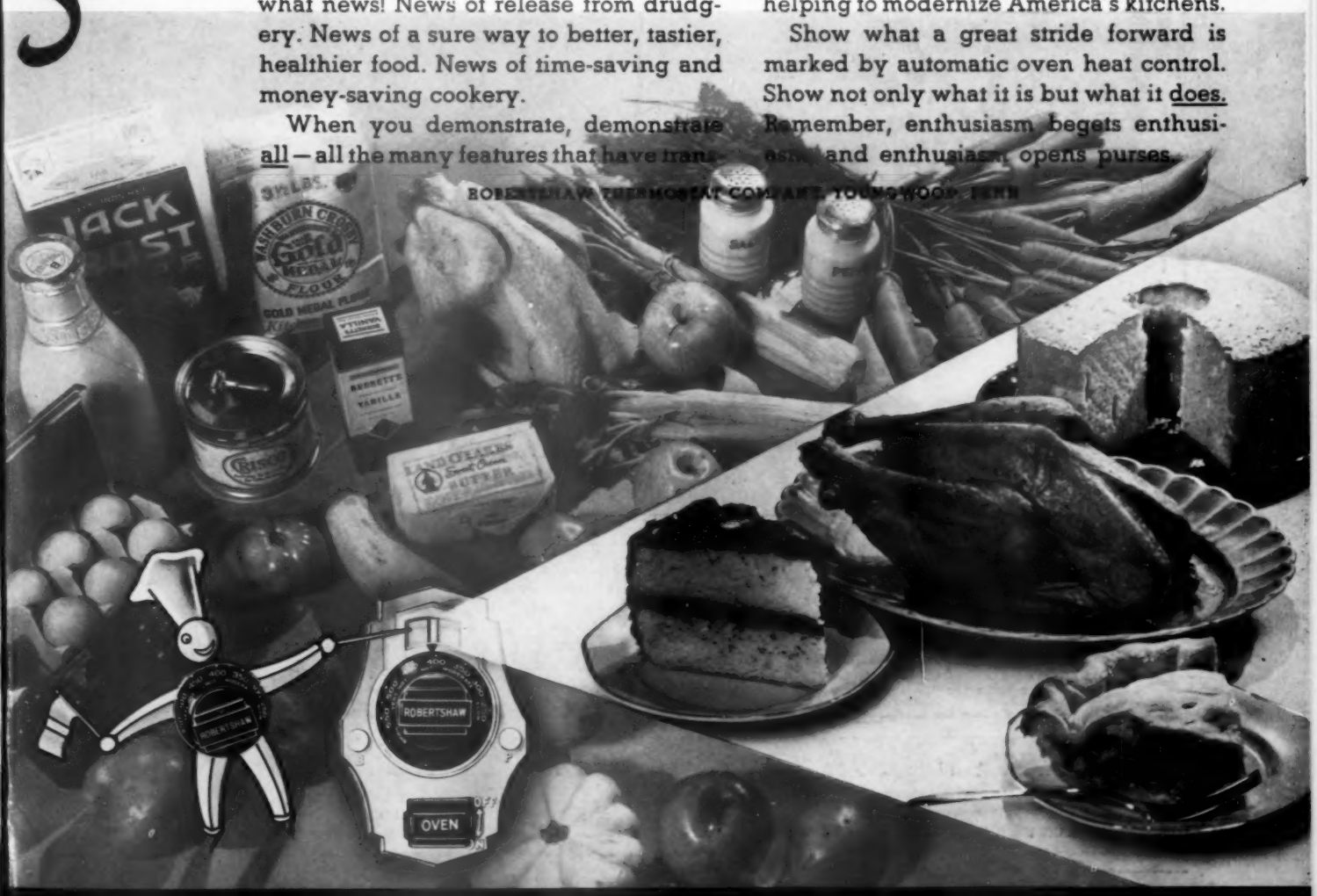
Sell the magic OF MODERN GAS COOKING WHEN YOU DEMONSTRATE GAS RANGES

To you it may now seem an old story, but to most of your prospects it's news. And what news! News of release from drudgery. News of a sure way to better, tastier, healthier food. News of time-saving and money-saving cookery.

When you demonstrate, demonstrate all—all the many features that have transformed the gas range, all the advantages they bring, all the pride that you take in helping to modernize America's kitchens.

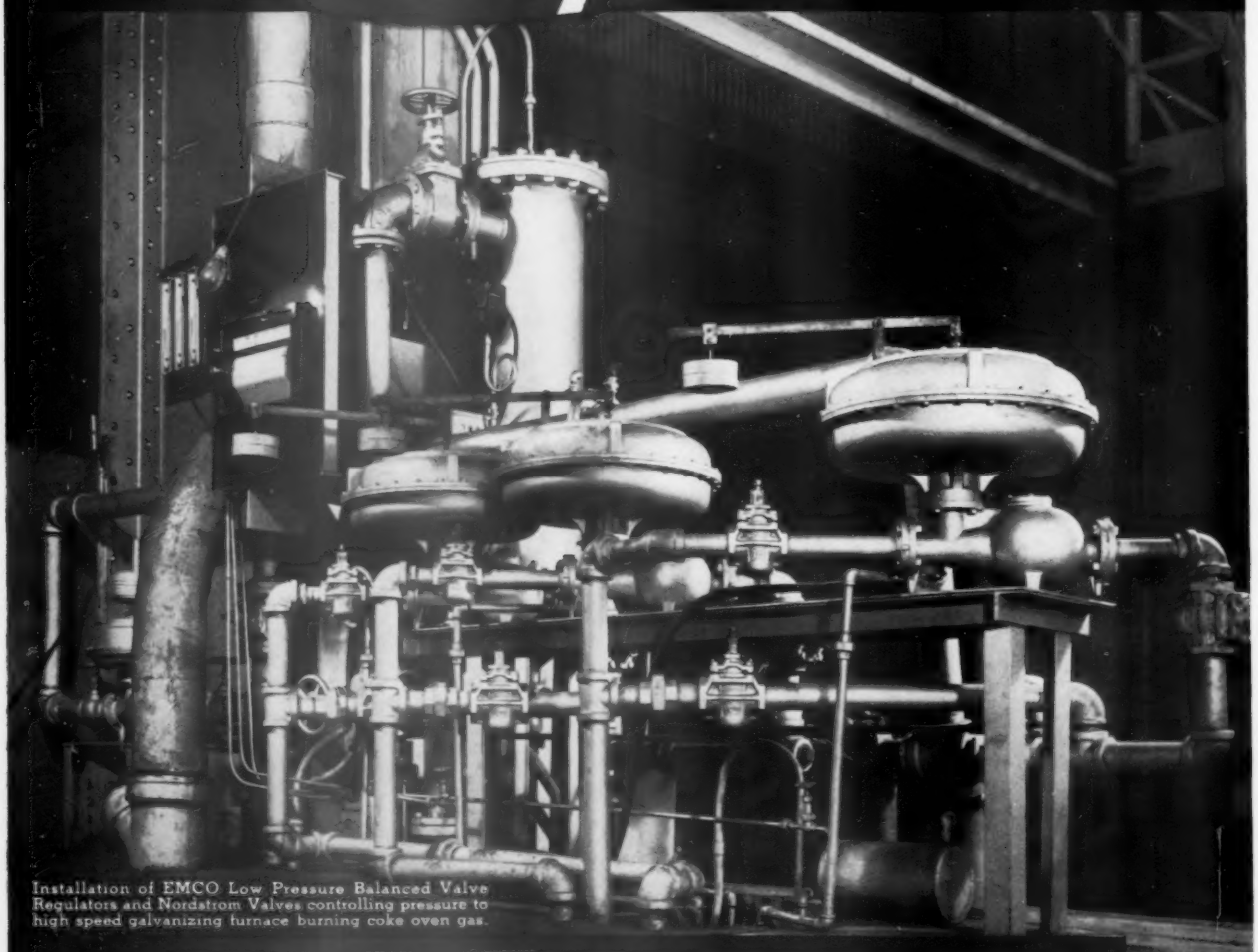
Show what a great stride forward is marked by automatic oven heat control. Show not only what it is but what it does. Remember, enthusiasm begets enthusiasm and enthusiasm opens purses.

ROBERTSHAW THERMOSTAT COMPANY, YOUNGWOOD, PENN.



ROBERTSHAW OVEN HEAT CONTROLS

EMCO adaptability



Installation of EMCO Low Pressure Balanced Valve Regulators and Nordstrom Valves controlling pressure to high speed galvanizing furnace burning coke oven gas.

A high degree of accuracy in pressure control is an essential factor in many combustion installations. In the application illustrated, combustion requirements dictated an accuracy of 0.1 inch of water column under widely varying conditions. To do this, EMCO Low Pressure Balanced Valve Regulators were chosen. Previous experience in hundreds of cases has proven that the design and adaptability of EMCO Regulators assures the accuracy of performance required.

PITTSBURGH EQUITABLE METER COMPANY

YORK CO NORDSTROM VALVE CO.

PITTSBURGH, PA.

AMERICAN GAS JOURNAL, November, 1938. Vol. 149, No. 5. Published monthly by American Gas Journal, Inc., at 34 North Crystal St., East Stroudsburg, Pa. Executive and Editorial offices at 53 Park Place, New York, N. Y. Entered as second-class matter, October 7, 1928, at the post office at East Stroudsburg, Pa., under the Act of March 3, 1879.

You Sell (CP) Equipment

BUT... DO YOU SELL THE *CLEAN* GAS IT DEMANDS?

Distributing *clean* gas, of uniform quality, is the only *sure* way to keep the users of C. P. Equipment well-satisfied... to keep their appliances operating as they should.

●

You must depend on your manufacturing and purifying equipment to produce the clean, quality gas now demanded. In many cases, this means modernization of and additions to your present facilities.

●

To assist you, Semet-Solvay offers you the benefit of wide experience in designing, fabricating and constructing equipment for the manufacture, cleaning and purification of gas to meet specific requirements.

●

Whenever you are considering changes or additions to your plant, make your problems known to us. Our complete organization is at your service.

SEMET-SOLVAY EQUIPMENT
FOR CLEANER GAS

WASHER COOLERS
Remove Tar

MULTIPLE WASHERS
Remove 90% of remaining Tar

NAPHTHALENE SCRUBBERS
Leave less than 4 grains per 100 cu. ft.

GAS PURIFIERS
Remove H_2S

CONDENSERS
Cool the Gas

and

SEMET-SOLVAY
WATER GAS MACHINES
FOR LOWER PRODUCTION COSTS AND UNIFORM QUALITY GAS

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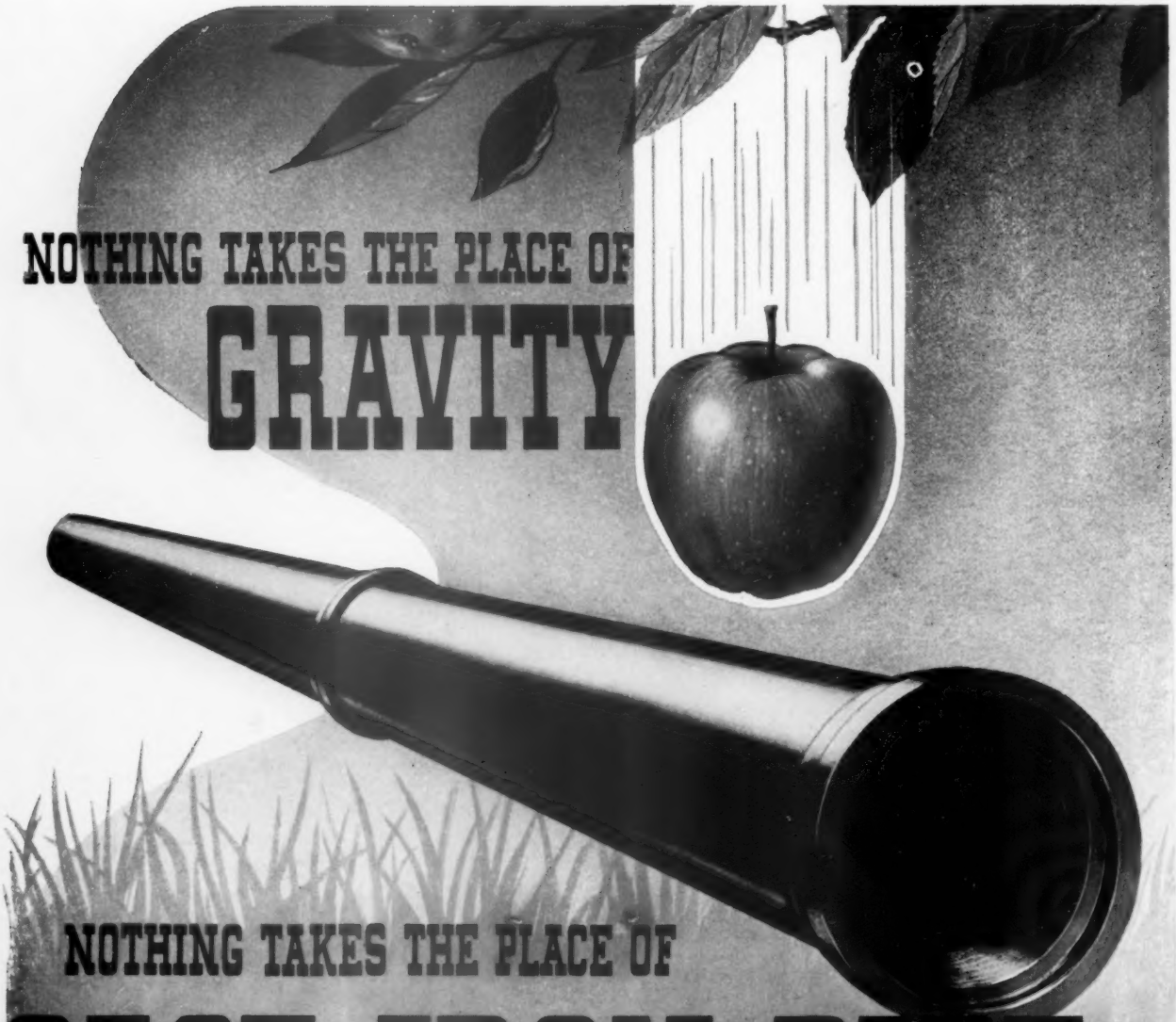


NOTHING TAKES THE PLACE OF

GRAVITY

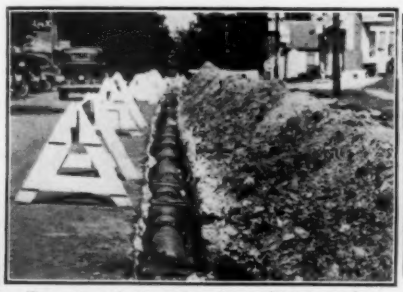
NOTHING TAKES THE PLACE OF

CAST IRON PIPE

THE tree from which Newton's apple fell was cut down in 1820. A cast iron underground main, laid in Newton's boyhood(1664) is still rendering satisfactory service. No one will argue the unique necessity of the law of gravity. Few will argue the indispensability of cast iron pipe for underground mains.

If you want proved long life and low maintenance cost that result from effective resistance to corrosion—assured safety margins for impact, beam load and crushing stresses—and permanently tight joints—then you will agree that nothing takes the place of cast iron pipe. Some materials meet some of these requirements but only cast iron pipe meets them all.

THE STANDARD MATERIAL FOR UNDERGROUND MAINS

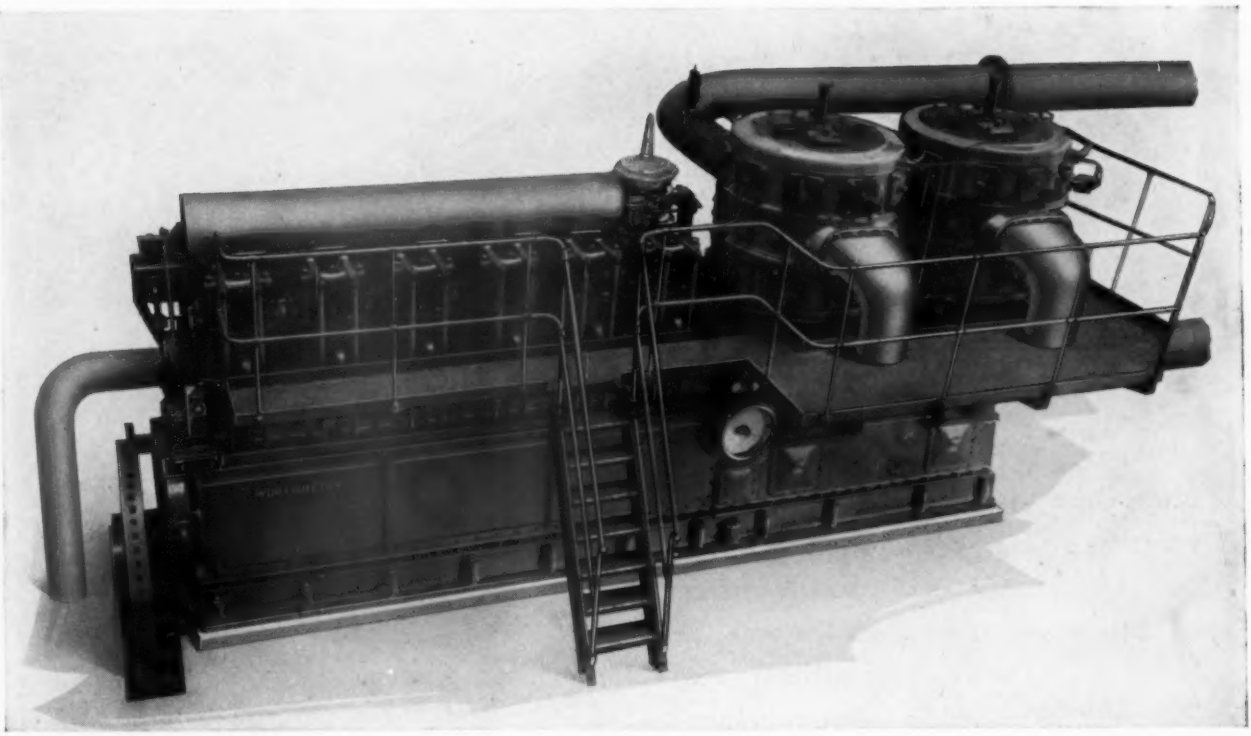


Recent installation of mechanical joint cast iron pipe for gas service replacing short-lived substitute material.

Look for the "Q-Check" registered trade mark. Cast iron pipe is made in diameters from 1¼ to 84 inches.

THE CAST IRON PIPE RESEARCH ASSOCIATION, THOMAS F. WOLFE, RESEARCH ENGINEER. 1015 PEOPLES GAS BUILDING, CHICAGO, ILLINOIS

Worthington leads again!



Worthington Vertical Gas Engine Compressor, one of four just built for a large public utility, for gas distribution service.

A MODERN VERTICAL GAS ENGINE COMPRESSOR

- **Built for economical, heavy duty service**
- **Requires less space and foundation than any other type**
- **Simplifies piping connections**
- **4-cycle, with force-feed lubrication throughout, therefore economical in fuel and lubrication**
- **Double-acting compressor cylinders**

Engine and Compressor Combinations can be made to suit capacity and pressure requirements.

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☆ Experience ☆
DESIGNS · REYNOLDS · REGULATORS

In 1892, the first Reynolds Regulator was built to fill a specific need of one of the gas companies. This close cooperation has existed down through the years. Hundreds of plant engineers have brought their problems to the Reynolds Engineering Staff and Reynolds has aided in solving their gas control problems.

INTERCHANGEABLE and ACCESSIBLE . . .

In the Industrial Gas Control field a few years ago the users of Regulators talked about making Regulators accessible for cleaning and repairing; also making the working parts interchangeable. Today's industrial regulators by Reynolds solve both problems. Experience, plus the needs of the field, design Reynolds Regulators.

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REPRESENTATIVES:

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Boston, Mass.

Wm. A. Ehlers,
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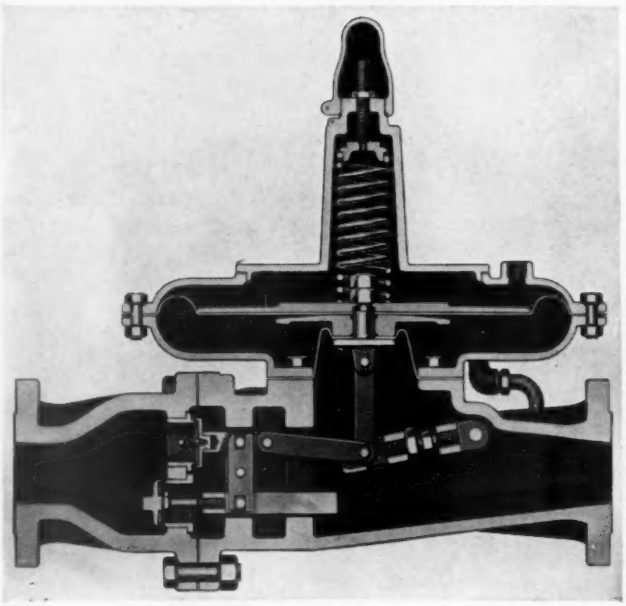
E. Orange, N. J.



REYNOLDS Toggle Type Regulators for industrial gas control offer these features:

Removable Valve Pocket and Orifices . . . side hand holes . . . streamlining that does not change direction of the flow of gas, increasing capacity and range . . . *pressure reduction from pounds to pounds and pounds to inches W. C. . . . single or double valve construction . . . spring or dead weight type adjustment and equipped with or without pilot control.

*Body of Regulator is so machined that a pounds to pounds diaphragm casing or pounds to inches W. C., diaphragm casing may be used or interchanged.

Recognized Gas Control Since 1892

REYNOLDS GAS REGULATOR COMPANY ANDERSON, IND.

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NUMBER 5

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ESTABLISHED 1859

NOVEMBER, 1938

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IN METRIC IRONCASE METERS, sustained accuracy of gas measurement begins right at the diaphragm. This follows the approved full bellows principle of design. It is sealed in a leak-proof body casting of one-piece gray iron — formed deep enough to avoid leather contact with corrosion-resistant case.

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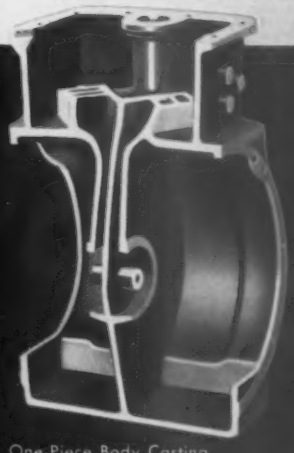
Ironcase leathers are the product of continuous research to develop the best leather and oils for specific gas conditions. Raw materials, uniformity of grade and thickness, special processing . . . all conform to strict laboratory standards.

Add these and other diaphragm qualities to the many distinctive Ironcase features. You have a proved total of meter accuracy and trouble-free service years. A full range of capacities; high or low pressures.



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Eliminates Internal Leaks

Volume and Pressure Gage
Charts Hourly Rate of Flow
and Pressure

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These and Other Important Features Fully Described in Catalog EG-40

NOVEMBER
1938

AMERICAN
GAS JOURNAL

VOLUME 149
No. 5

The 20th Annual Convention
American Gas Association

GAS—The Modern Fuel for Home and Industry—Marches On. That was the underlying theme of the American Gas Association Convention, held at Atlantic City, N. J., October 10th to 13th. An attendance of over 2300 indicates the widespread interest in the program.

Quite clear it was that successful development of sales and other promotional activities along modern lines is actively under way. The era of organization and initial planning seemed largely past. National advertising is an accomplished fact, better gas appliances are here and a large proportion of companies have modernized their new business policies. To be sure the job is far from complete—it never will be finished—but there was a definite feeling that we are on the right track and that our efforts are beginning to show tangible results.

Research was stressed. Not the spectacular front page news variety of research where revolutionary development makes existing equipment obsolete and turns an industry upside down. Rather the carefully planned research directed toward the definite objectives of improving products and decreasing costs with the least requirement for new apparatus. Well directed research seeks to conserve existing plant and equipment and make it more efficient, not to make it obsolete. This was ably brought out by Professor Erwin H. Schell of M.I.T. in a paper printed elsewhere in this issue.

Dr. E. R. Weidlein, Director of the Mellon Institute of Industrial Research, also talked on "The Aid of Research to Industry." He stressed the time element of research. "American industries," he said, "are in fact constantly becoming more research-minded, but many times an industrialist still expects in several weeks a scientist's answer to a problem with which an industry has struggled for 10 years without success. If an industrialist understands the background that is required to attack a new problem intelligently, he will realize the importance of basic research. A thorough fundamental study should first be made of every major problem and this investigation takes time. Immediately the industrialist will react to such delay and yet, if left to his own devices, he will be confronted with his problem for the next decade. It necessitates in general a period of 10 years from the time an important new idea is conceived until it can be developed into a new industry."

CONRAD N. LAUER
President

Merrill N. Davis, President of the Association of Gas Appliance and Equipment Mnaufacturers, gave a very fine presentation of "The Manufacturer's Viewpoint." "I wish to contribute my bit," he said, "by furnishing you conclusive evidence that we have cause to be optimistic. At the same time, I should like to make certain recommendations based upon "the manufacturer's viewpoint" which, if acted upon, I believe will result in an even more optimistic point of view twelve months from today.

"First, allow me to approach my subject from a somewhat critical viewpoint by saying that many in our industry have been making futile attempts to buck a national trend that is founded on 'a new mass thought and emotion.' Pessimists have had a field day and sad songs about a world gone wrong seem even to come from within our industry. I believe that many leaders in our business are still wasting much of their time by debating, planning, and arguing among themselves against the reality of this new psychological condition when their thoughts should be concentrated upon constructive industry planning and action. This is no time to 'rest on our oars' waiting for business skies to clear. We must not al-

WALTER C. BECKJORD

low any of the various branches of our business to stand like piling in the sand bar, which, when the tide ebbs, is left naked and beaten.

"While I feel that as a figure of speech the words 'pump priming' have been terribly abused, I think that in its true sense pump priming is just what we need to do in our industry. We must strengthen our own pulse and draw food into our life's stream from every source. For example, we might benefit from our present apparent national adversities by realizing more gas sales and load increases from the United States Housing program in this current national spending spree. Eight hundred million dollars have been appropriated for use of American cities in their participation in the Federal Government Long-Range, Slum-Clearance, and Low-Rent Housing program. Already, about $600,000,000 have been ear-marked for specific housing projects.

MERRILL N. DAVIS

"'Fair-weather management' is easy, but it takes real ability and courage to intelligently and successfully conduct a business under present economic conditions. I am glad to say, however, that it can be and is being done right now in our own industry on many fronts.

"In the face of a decline of gas range sales for the first half of 1938, it took courage when the range manufacturers answered the gas com-

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Chairman-Elect

H. E. EHRMANN
Chairman-Elect

F. X. METTENET
Chairman-Elect

panies' requests for the C.P. Gas Range. This project involved the investment of hundreds of thousands of dollars in retooling factories, but I feel that ample justification is furnished by the following facts:

1. The gas industry now has an appliance which best utilizes our fuel and properly interprets the advantages of gas over competitive fuels.
2. Nearly 3,000,000 promotional pieces and items have been purchased from the A. G. A. E. M. plan-book for localized promotions of C.P. Gas Ranges.
3. Nearly 300 gas companies have already launched campaigns for the promotion of this crowning achievement.
4. Enthusiastic consumer acceptance of C.P. models indicates that gas ranges will be one of the first major appliances to pull itself out of the present sales slump.

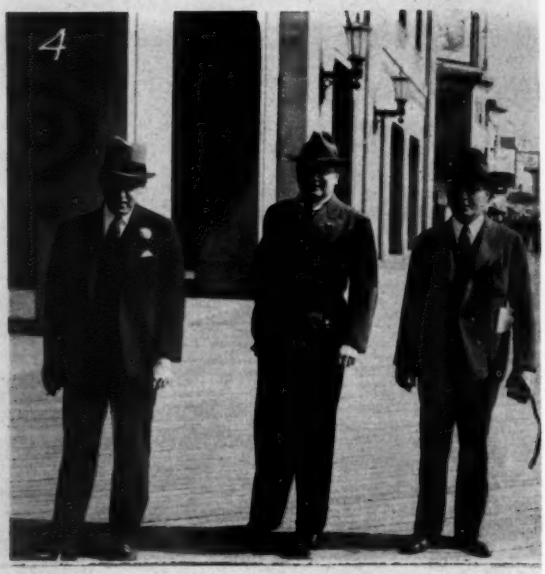
FRANK H. TREMBLY
Chairman-Elect

"The fact that no manufacturer of gas equipment is as large nor as well equipped to compete on a national scale may or may not be the manufacturer's fault, but the fact remains that such is the case. Therefore, it behooves us to remedy this condition as rapidly as possible by having our combined industry, both utilities and manufacturers, become even more retail-dealer minded than the combined electric industry.

"I think that our industry should recognize at once that there are definitely two distinct types of retail appliance dealers. One group is the 'basement appliance dealers' consisting of plumbers and heating contractors. They definitely are an asset to our industry because of their ability to sell water-heating and house-heating equipment. With this group, I feel that our industry has practically reached the correct solution for cooperation. There is still some room for improvement and we are rapidly ironing out our small differences. In Major Forward's recent paper entitled 'Getting Together for Sales' which he delivered in February of this year before a master plumbers' association, he stated, 'During the years since May 2, 1931, there has come to the A.G.A. no suggestion for any change in the agreement then entered into with enthusiasm and good faith. Recent consideration indicates that the principles then laid down and agreed to are just as good in 1938.' I agree with Major Forward and would urge those utilities and manufacturers who have not yet adopted those principles referred to for cooperation with plumbers and heating contractors, to reconsider and do so as a means of increasing their sales of water-heating and house-heating equipment. Briefly, those principles referred to are:

1. Cooperate with dealers only on the sale of approved quality merchandise.
2. Sell no equipment not directly related to the use of gas.
3. No premiums or allowances should be made on merchandise with which all cooperating agencies may not participate in consistency with present-day, good merchandise practices.
4. Utilities should engage in 'promotional activities' instead of consistent merchandising efforts only

F. M. GOODWIN
Chairman-Elect



Photos by King,—A.G.A.

Intimate Shots Here and There During the Convention

1.—(Left to Right) W. P. Hutchinson, Pres., Sprague Meter Co., Bridgeport, Conn.; Francis E. Drake, E. M. Gilbert Eng. Co., N. Y. C.; Ross C. Cornish, Haverford, Pa. **2.**—Miss Mildred R. Clark, Home Service Supervisor, Oklahoma Natural Gas Company, Tulsa, Oklahoma; R. W. Ducker, Oklahoma Natural Gas Company, Tulsa, Oklahoma; Miss Goldie C. Viele, Pittsburgh Equitable Meter Co., Pittsburgh, Pa.; Miss Jessie McQueen, A. G. A. Headquarters, New York City; J. H. Warden, Oklahoma Natural Gas Company, Tulsa, Okla. **3.**—F. F. Bogardus, Roots-Connersville Blower Corp., Connersville, Indiana; W. S. Guitteau, V. P. Stacey Bros. Gas Construction Co., Inc., Cincinnati, Ohio; L. J. Brown, Pres., International Stacey Corp., Columbus, Ohio, B. C. O'Brien, Roots-Connersville Corp., Connersville, Indiana. **4.**—George E. Whitwell, Philadelphia Electric Company, Philadelphia, Pa.; H. B. Childs, Panhandle Eastern Pipe Line Co., Walter C. Beckjord, Columbia Gas & Electric Corp., 61 Broadway, N. Y. **5.**—F. M. Goodwin, Boston Consolidated Gas Co., Boston, Mass. **6.**—R. F. Bonsall, The Consolidated Gas Electric Light & Power Co., Baltimore, Md.; Wallace G. Murfit, Philadelphia Electric Co., Philadelphia, Pa.

on those appliances not yet having public acceptance.

5. Coordinated advertising programs should be developed.

6. Maintain 'deferred payment plans' only on an economically sound basis.

"There are about 30,000 plumbing and heating contractors to whom this type of cooperation should be extended. To attempt to compete with them instead of enlisting them as supporters of our cause is, to my mind, sheer folly and will eventually lead to defeat. To my mind our combined failure to more fully enlist this army by follow-through with those established cooperative principles more enthusiastically, is the principal reason why unsound summer-winter-hook-ups for oil-burning equipment are increasing in popularity. Failure in properly educating this group of dealer outlets to the advantages of our fuel and equipment may also be the reason why that last year in that little twelve-month period there were more oil burners sold than is represented by our combined sales of central gas heating plants in the history of our existence.

"But now I come to that other group of dealers made up of department, furniture and hardware stores, radio and specialty appliance dealers. This is the group that so materially affects our important kitchen load and with whom we have not fared so well. We all recognize and are concerned with the fact that our domestic load is declining and that the ratio of gas-to-electric-range sales has decreased from ten gas-range sales to one electric-range sale in 1933 to as little as four gas-range sales to one electric in the last year. While we consider electric ranges to be still in the promotional stage, over one-half of the electric ranges sold last year were sold by dealers. In other words, here we talk about the 16,000,000 customers now cooking with gas and admit and boast that ours is the ideal and accepted fuel, yet we have dealers selling no greater percentage of our heat-controlled ranges than they are selling of fully equipped electric ranges during the infant stage of public acceptance of that appliance. A recent survey discloses that out of 19,000 department store and appliance dealers, exclusive of plumbing and heating contractors, 13,000 of them are now handling electric ranges. This shows how our competitors have taken advantage of sales opportunities offered by this class of dealer outlets. What will this vast army of dealers do to us at their present rate of progress with electric equipment, especially ranges and refrigerators, if and when electric ranges should gain public acceptance? Maybe I can show you by taking the case of automatic refrigerators which we all admit now have that so-called public acceptance. For instance, last year such dealers sold about 1,600,000 electric refrigerators. In other words, in 12 months, dealers opened the doors of a vast number of American homes to the acceptance of mechanical refrigerators, a great part of which would have been gas refrigerators if this last mentioned class of dealers had been sold upon the superiority of gas refrigeration by our aggressive sales cooperation and sales training.

"Need I go further to show you the value of this group of dealers to us if they were enlisted as our allies? Need I go further to show you what these dealers could do to bolster our range sales if they were enlisted to our cause? Need I go further to warn you of the harm they can and will do if we compete with them or fail to educate them to the superiority of our product and extend to them equal cooperation?"

In his Presidential Address, Mr. N. C. McGowen took an optimistic view of the future. Said he: "The outlook is distinctly encouraging in that while our revenues from industrial and commercial sales reflect, in part, only the present industrial slack, our domestic revenues and the total number of customers are increasing despite the difficulties of the times."

Mr. McGowen spoke of the study that had been given to the scope, value and cost of the A.G.A. activities and of "certain amendments to the constitution and by-laws which, if adopted, will redefine the purposes of the Association, clarify the qualifications for membership, admit to membership the pipe line and gas producing companies and increase the directorate to adequately take care of important interests and geographic districts."

N. C. McGOWEN

He discussed the progress of the National Advertising Program, the Home Planning Bureau, the CP Range, Research, and finally urged an even more intensive sales promotion.

The second session opened with a report of the Rate Committee, presented by its chairman Donald A. Henry. This is reprinted elsewhere in this issue.

Early Arrivals at Atlantic City: (Left to right), H. M. Brundage, Washington Gas Light Co., Washington, D. C.; Miss Jessie McQueen, A. G. A. Headquarters; Major Alexander Forward, Managing Director, A. G. A.; Clifford Johnstone, Pacific Coast Gas Association, San Francisco, California; Miss Gladys B. Price, Southern California Gas Company, Los Angeles, California; Miss Mildred R. Clark, Oklahoma Natural Gas Company, Tulsa, Oklahoma.

Hon. Alexander M. Mahood, President, National Association of Railroad and Utilities Commissioners, Charleston, W. Va., discussed "The Development of Regulatory Processes" with especial reference to the Lea Bill. He said: "It is not, in my opinion, the novelty of the situation that disturbs you, but it is the fear that orders will be entered, rules promulgated, regulations prescribed, and reports required, arbitrarily and without opportunity for hearing, that will prove burdensome and expensive. I seriously doubt that these things will happen. State commissions and the Federal Power Commission must deal with you fairly. If, in a friendly spirit, you cooperate with the regulatory agencies you can go a long way towards eliminating the possibility of these fears being realized. The Supreme Court of the land in recent years has made it clear, in plain language, concerning which there can be no false interpretation or misunderstanding, that regulatory agencies must give those they regulate a fair deal.

HON. ALEX. M. MAHOOD

CHARLES G. GROFF

"Let us look at some of these decisions. On January 7, 1935, the court, in the West Ohio Gas Company case, in criticizing the finding of the Ohio Commission relative to waste of gas and requiring the company to account for this waste, said:

> 'There is neither a word nor a circumstance to charge the management with fault *** there is not even the shadow of warning to the company that fault was imputed and that it must give evidence of care. Without anything to suggest that there was such an issue in the case, the commission struck off 2%, it might with as much reason have struck off 4 or 6. This was wholly arbitrary.'

"There should not exist between the utilities and the regulators a feeling of hostility. In order that regulation may be effective, and not burdensome and unduly expensive to you, a friendly spirit must exist, and there must be close cooperation between the two. The thought seems sometimes to be held that the effectiveness of regulation is measured by the amount in rate reductions that a commission has been able to bring about through formal proceedings or otherwise. This is only part of the story. The public in the last analysis, must continue to receive utility services. It is dependent upon utilities for light, heat, water, and communication services. These services it has become accustomed to. It will not do without them. To be effective, therefore, in the public interest a commission must not confine itself solely to securing reductions in rates. It must be equally concerned that the utilities under its jurisdiction are kept in a position that they can render efficient, continuous, and adequate service at all times. In short a public service commission should be what its name implies, a protector of the public service. It must protect the public, which has little means or ways to protect itself, in the right of the public to service at rates that are just and reasonable, but it must also protect the efficiency and continuity of that service.

"That Congress has in mind in passing the Lea Bill merely the closing of a gap in regulation by extending it to transactions not within state jurisdiction is strongly brought out in the act itself. The provisions of the act withhold jurisdiction from the federal commission over local rates and local matters and explicitly restrain that commission from entering the local field, thus leaving to the state authorities the undisputed occupancy of that field. The purpose of Congress in this respect was clearly stated in the report of the House Committee on Interstate Commerce, which in reporting favorably the Lea Bill, and after reciting that the purpose of the bill was to confer jurisdiction upon the Federal Power Commission over the transportation of natural gas in interstate commerce and the sale in interstate commerce of natural gas for resale for ultimate public consumption for domestic, commercial, industrial, and other use, said:

> 'The states have, of course, for many years regulated sales of natural gas to consumers in intrastate transactions. The states have also been able to regulate sales to consumers even though such sales are in interstate commerce, such sales being considered local in character, and in the absence of congressional prohibition subject to state regulation. (See Pennsylvania Gas Co. v. Public Service Commission (1920) 252 U.S. 23.) There is no intention in enacting the present legislation to disturb the states in their exercise of such jurisdiction'."

"Household Sales—Methods and Practices" was the subject of a paper by Charles G. Groff, Chairman of the Board, Servel, Incorporated, New York, N. Y. "Personally," he said, "I think of sales possibilities for any household appliance in terms of the number of trained men who can be led to create a sufficient number of sales for that particular appliance so that on a fair rate of commission a substantial *yearly* income for them would be provided. I do not ignore the fact that the *buying* habits of the public fall into seasonal cycles. But the subject we are considering is creative selling of specialty services, and I hold that it is sales management's job to prevent such unnecessary cycles in *selling* habits—and the only practical way I know of doing this on a given appliance is to provide a year-round opportunity for a salesman to profitably sell that appliance as his sole responsibility. This provision includes the counsel, the cooperation, and the inspiration of experienced and enthusiastic management which itself knows the year-round possibilities and is capable of keeping that idea sold to the salesmen.

"I have no hesitation in predicting that the nearest approach to the conditions I have just mentioned, if multiplied by the number of men who thus could be employed throughout the land, would raise the sales of gas water-heaters, gas ranges, gas refrigerators, and gas household heating equipment, to their highest practical levels. All history of specialty selling supports this viewpoint."

Paul W. Herring, Chairman of the Committee on Personnel Practices of the A.G.A. reported that: "As the business value of urgent necessity for good employee relations gains wider recognition, management is adopting policies indicated by the following statement of the personnel policy of one large concern which portrays a very keen appreciation of the need for human relations in industry.

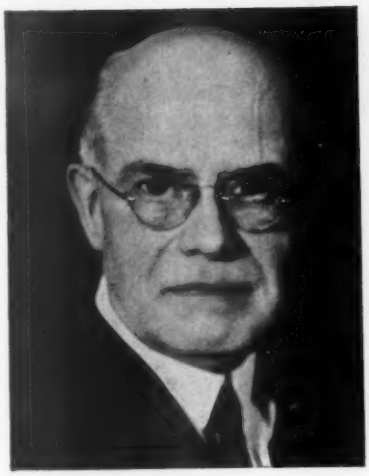
'Remove from every company, department and office every practice, policy, custom, and tradition which is inconsistent with each individual's feeling that he is a part of the enterprise or which harks back to the old master and servant concept, or to the concept that a contract is the only tie between the individual employee and the company.

'Develop and encourage every proper practice, policy, custom, and tradition which will affirmatively tend to make each one feel that he is a part of the business, and therefore, ready and anxious to asume all the responsibilities, both individual and joint, as well as to enjoy the privileges and compensation that go with that relationship.

'Develop ways and means and contacts by which to discover the individuals or groups who have not reached the point of feeling that they are anything more than servants, or hired men, and direct special and intensive effort toward making them see that employment in the company presents an infinitely more satisfactory and self-respecting status if they will only accept it and live it.'

"These statements offer supporting evidence that the fundamental problem facing management today is in evolving a method of dealing with employees, individually or collectively. In finding a workable solution, many companies are beginning to recognize the fact that a centralized unit is of distinct value in handling employees' problems. Facilities for evaluating the individual must be in the hands of a competent group. The employee must have available to him proper guidance and sound suggestion; someone must be ready to direct him toward self-improvement and ultimate success.

"In final analysis the value of personnel administration and its part in management is judged by the economic result attained. Your committee is of the opinion that, only after adequate consideration is given to right policies and demonstrated performance of sound employee relations, can the industry expect to reach its objective of increased sales through public and employee acceptance."



PAUL HERRING

The natural gas industry, still young and facing opportunities for further expansion, should be treated as an industry requiring "creative rate regulation" instead of the present type of "protective" regulation that hinders rather than encourages the development of new and vigorous enterprise for the economic good of the country. This was the main point of an address on the "Opportunities and Responsibilities of the Natural Gas Industry" given by Joseph E. Pogue, Vice President of the Chase National Bank.

Mr. Pogue, who is a recognized authority on the petroleum and natural gas industries, declared that it is important to sustain a dynamic trend in the growing natural gas industry and that as time goes on the problem of sustaining continuity of supply of this natural fuel will involve the tapping of more widely scattered sources, the coordination of which will involve large-scale efforts. He pointed out that the known proven reserves of natural gas in the United States are authoritatively estimated at from 60 to 75 trillion cubic feet or enough for 25 to 30 years' future supply at the current rate of consumption. That extensions of the known supply are possible for a long time is beyond question, although even with this backlog the continued discovery of new reserves is a fundamental requirement of the industry.

Pointing out that recent court decisions affecting the rate of return for the industry center around 6½ per cent, Mr. Pogue said that under existing procedure several important factors in the rate-making problem often are disregarded. Three elements should be considered, he said: pure interest, compensation for risk, and a residual element essential to sustain a dynamic quality in the industry.

He concluded by saying:

"We are living in a period when profound social forces are at work and the whole economy is in a phase of rapid flux. Considerations in respect to the distribution of wealth are in the forefront of all public discussions, while the methods of creating wealth are relegated to second place or taken for granted. The great resource industries are wealth-creating activities, for they bring to the service of mankind in usable form the products of nature which are worthless if not vitalized into action by aggregates of technology, capital, and man-power. Throughout this paper runs the theme of treating an industry as a growing, living, economic organism engaged in doing a job. Of course there are flaws, the need for 'reforms' are clearly admitted; but vital industries are constantly engaged in perfecting their activities on all fronts: they have to, else they go backward. It is an important fact that an industry is greater than the sum of its corporate parts, just as the human organism is something more than the aggregate of the chemical elements that compose its body. There is a plus-over part that acts as a spark or catalytic agent and this element is the constituent of greatest value to society."

An address by Mr. Floyd L. Carlisle, Chairman of the Board of the Consolidated Edison Company of New York on "What the New York World's Fair Means to Industry" appears elsewhere in this issue.

Other addresses and papers presented at the General Sessions were:

The Golden Gate International Exposition:—Norman R. McKee, Vice-President, Southern Counties Gas Co., Los Angeles, Calif.

An Average Consumer Swaps Problems with the Gas Utilities:—Mrs. William Dick Sporborg, Chairman, Department of Legislation, 1935-1938, General Federation of Women's Clubs, Port Chester, N. Y.

National Advertising: — Colonel Willard Chevalier, Publisher, Business Week, New York, N. Y.

The Beal, Munroe and A. G. A. Medal Awards

J. N. HOLOUBEK A. M. BEEBEE H. C. COOPER

A. M. Beebee, general superintendent, gas department, Rochester Gas and Electric Corporation, Rochester, N. Y., was singularly honored at the annual convention of the American Gas Association for contributing the best paper to Technical Section meetings of the Association throughout the year. Mr. Beebee received the Beal Medal for his paper entitled, "Time Marches On—Where is Manufactured Gas Marching?" which was presented at the joint Production and Chemical Conference held in New York City, May 23-25, 1938.*

The award was presented at the second general session, October 12, by the donor Ernest R. Acker, president, Central Hudson Gas & Electric Corporation, Poughkeepsie, N. Y., representing the family of the late W. R. Beal who established the award in 1897. It consists of a bronze medal and substantial cash payment.

Mr. Beebee is the newly-elected vice-chairman of the Technical Section for the year 1938-1939. He was chairman of the important Carbonization Committee of the Association in 1924-1925. He has also been on the Managing Committee of the Technical Section for a number of years and has served on numerous other Association committees, including the Editorial Committee of the Gas Engineers' Handbook, and the A.G.A. Purging Code Committee for Gas Holders, as well as the present Purging Committee. He was chairman of the gas section of the Empire State Gas & Electric Association from 1932 to 1935.

One of the highest honors within the gift of the American Gas Association was conferred on Howell C. Cooper, president of the Hope Natural Gas Company of Pittsburgh, Pa., at the second general session of the Association's annual convention in Atlantic City, N. J. Mr. Cooper received the Charles A. Munroe award for having made the most outstanding contribution of an individual toward the advancement of the gas industry. The presentation was made by the donor, Charles A. Munroe, of New York, past president of the Association.

The award was made to Mr. Cooper for his distinguished work as chairman of the Main Technical and Research Committee of the Natural Gas Department of the Association and for his leadership in the solution of engineering problems. In the 16 years of this committee's extremely productive existence, during which he has served continuously as chairman, he has been the leader of a research program on gas measurement, pipe line flow and gas well delivery capacities and other research undertakings of vital importance to the gas industry. In fact, the committee was formed as a direct result of an address Mr. Cooper delivered at the 1922 convention of the Natural Gas Association of America, which later became a part of the American Gas Association.

While many eminent natural gas engineers have been associated with Mr. Cooper on the committee and have contributed greatly to its accomplishments, he has continued through the years to chart its course and make possible its remarkable achievements. In the opinion of the Charles A. Munroe Award Committee, Mr. Cooper "has been largely responsible for the unique and respected position which this committee has earned in the scientific circles of the gas industry and related industries."

Since 1930 Mr. Cooper has served on various committees of the American Gas Association, including Time and Place, Gas Measurement, Nominating, Association Activities, and Gas Standards. He served as chairman of the Natural Gas Department of the Association during 1930-1931. He was elected a member of the Advisory Council in 1933, serving three years, and in 1935 a member of the Finance and Control Committee, in which capacity he continues to serve. He was elected a director of the Association in 1936, serving a two-year term.

Heroic action by John N. Holoubek, by-products foreman of the Consolidated Edison Company of New York, Inc., was recognized at the annual convention of the American Gas Association. Mr. Holoubek was awarded the American Gas Association Meritorious Service Medal for having performed the most outstanding meritorious act in the gas industry during the past year. The presentation was made by the Association's president, N. C. McGowen.

Mr. Holoubek was so singularly honored for coping unaided with a situation in which his bravery, judgment and performance avoided the possibility of a more serious accident, further loss of property and aided materially in the restoration of normal operating conditions so that there was no interruption in the operation of one of the country's largest gas plants. The act is described in the citation as follows:

"On September 6, 1937 a severe fire and explosion occurred in a tar separator at the Astoria Plant of the Consolidated Edison Company of New York, Inc. The explosion ripped the steel cover approximately in the center and folded the two sections back and over the end walls containing the separator. A number of men were on the cover at the time of the explosion, including John Holoubek. The explosion apparently threw him into the air and he fell on his stomach across the side railing where he lay unconscious for a time. His socks and the lower end of his trousers had taken fire and this may have had the effect of bringing him to. He beat out the fire and in spite of numerous contusions, fracture of several ribs, burns about his face and arms, and twice fainting, proceeded about his duties.

"He realized first of all that the man who was in immediate charge of the separators was missing. (This

* *This paper published in full in the June, 1938, issue of American Gas Journal.*

man was killed by the explosion and found in the separator). Mr. Holoubek then checked the latter's duties and satisfied himself that the Generator House service apparatus was in satisfactory condition. After this he shut off the relief holder drip which was discharging tar through the broken lines into the separator pit. He then proceeded to shut off the drain lines to the separator from the adjoining tar tank.

"Going back to the separator Mr. Holoubek discovered the pumps for discharging the separator water overflow had been put out of commission. He climbed down into the pit, unlocked and opened the 12" emergency drain valve which prevented the flooding of the separators and the separator pit.

"All of the work enumerated involved a great deal of walking and climbing. His clear, concise report on the status of the apparatus and operating conditions to his associates and superiors enabled operations to continue and the necessary repair work to proceed with dispatch. A later review of all he had done showed that the procedure taken by him, in spite of very painful injuries, would not have been changed in any respect. His injuries kept him at home for nineteen days."

He has fully recovered from the injuries he sustained at the time of the accident and is performing his regular duties.

September 21, 1938, Hurricane & Flood Experience At Providence Gas Company Plant

by
I. J. True

Assistant Engineer of Manufacture
Providence Gas Company

Editor's Note.—At the time our October issue went to press the Providence Gas Company was still fighting a winning battle against tremendous odds to maintain uninterrupted service to the public. We could not then report anything but the barest outline of what had and was taking place. Now we have the report of a man who was in the thick of it. With the matter-of-fact conservatism so characteristic of an engineer, Mr. True seems at first to have reduced to almost a commonplace a story of courage, determination, physical endurance and loyalty of an entire company organization, and of outstanding initiative and personal achievement of at least fifty individuals. Picture yourself in the situation here described, with men swimming from the power plant, stretching a rope for those who could not swim, roofing and sheeting flying in the wind, boiler room on fire, coke ovens flooded, machinery submerged, a holder gone, and all the rest. We quote from a company memo.: "While the water was at the maximum level, coffee and sandwiches were served in the restaurant." Again we quote. "Saturday, September 24th. This morning for the first time it began to look as though there was a fair chance of maintaining gas service to the city and at the same time keeping the ovens heated up until operation of them could be resumed." When we attempt to picture the conditions and realize that a single serious error by a single individual might well have caused a different story to be written then the simple factual account here given takes on a drama hard to equal.

The hurricane and flood of September 21, 1938, caused the following at the plant of the Providence Gas Company:

The loss of steam power, electric power, gas and coke generation at the coke ovens; loss of communication by telephone within and outside of the plant; the shutting down of producer gas plant; stopping of gas pumping into storage holders and to outlying districts; thorough soaking of electrical and mechanical equipment with salt water; flooding of basements in which were spare parts, stores, locker rooms; the blowing away of the two coal bridges used for handling oven coal and damaging them to a certain extent; blowing off a few coal belts and miscellaneous metal roofing and siding; the upsetting of a storage tank 25 feet in diameter by 50 feet high; floating a 50 feet x 40 feet tar storage tank off its foundation and damaging tank when it came to rest; the rolling over of a horizontal round oil tank 8½ feet in diameter by 25 feet long; the starting of a fire in the boiler room which could not be fought for two hours due to six feet of water in the yard and the hydrants being submerged.

The water came in at about 5 P.M. and was nearly out at 8:30. It reached an elevation of about 14 feet above mean high tide, the elevation of our yard being about 8.5 feet. Unlike river floods, which stay in for some time, this flood was of short duration and deposited practically no silt.

The low pressure city distribution system was not flooded except in the main business district, nor was the holder outlet at the plant. A very large percentage of customers continued to receive gas service without interruption. The gas supply was changed over from 100% coal gas to 100% carburetted water gas, with a reduction in gas pressure but no changes to burners.

Gas piping to our restaurant remained intact, thus aiding the men in drying their clothes and enabling us to prepare hot meals and maintain

Presented before Operating Division, New England Gas Association, Worcester, Mass., October 28, 1938.

refrigeration facilities throughout the emergency. City water pressure did not fail, although one of the large floating tanks came to rest about ten feet from a hydrant. No buildings collapsed or received serious damage, except one old storage shed which went down. No injuries were received at the time of flood and hurricane except a very few minor ones. Only one semi-serious one occurred, and this not until about five days later when a man slipped on oil and cracked two ribs, this being the only lost time accident.

Steam pressure failed at 6 P.M. on September 21st and started on its way up at 1:30 the next morning. A great aid in restoring pressure was a boiler capable of burning gas, oil, or tar. Gas was used at first, and then oil after a temporary two-inch line was run by aid of flashlights and hand tools. Coke breeze fired stokers maintained the pressure after the ash pit runway had been pumped out by the city fire department pumper, and an accumulation of oil was removed. The stoker grates had to be turned by hand for about twenty-four hours until temporary power and motors were obtained from the outside. Locomotive cranes and dinkies connected to main system also helped bring up steam pressure.

Fires were lighted in water gas sets and these were ready to make gas at 2 A.M., but not enough steam was available until shortly after noon. Water gas was made in sufficient quantities in three 11-foot sets to supply domestic customers at reduced pressure, as well as to heat the coke ovens for eleven days, when some coal gas became available. During this time a hastily gathered operating crew and clinker gang, backed up by repair men kept the water gas plant running under great odds. At first practically the only lights were kerosene lanterns, hours were long and there were no days off. Side wall clinker gave trouble. Separators gave trouble due to the mixing up received by the flood and due to being worked too hard. After about a week of continuous operation holes started appearing in the generator linings. As a means of protecting the shells a hot patching material was sprayed on with a cement gun at each cleaning of the fire. This arrested growth of holes and protected the shells. This is probably not a substitute for firebrick linings, but a means to carry through an emergency. In case it did not prove successful plans had been made to cool the shells by blowing steam on them at points where the lining had failed, until a layer of ash was built up well above the grates.

The big portion of electric power used is generated by our own machines. This is 250-volt direct current. This generating equipment was flooded. One unit was started up after wiping, cleaning with carbon tetrachloride, and air drying with a portable air compressor. It lasted about twelve hours. Except for this and a small amount of alternating current power, which was not available until late the day after the flood, the plant was completely without power until Sunday, October 2nd, eleven days after the flood. This power was then furnished by a 500 k.w. motor generator set which was delivered overland from Schenectady, set up and running three days after the rental order was placed. This was powered by a temporary sub-station set up by local power company. One of our generators was brought back by soaking the armature in warm fresh water circulating for about twenty-four hours, then baking until of proper resistance. The other generators had to be rewound, including the commutators being rebuilt. In general, the most satisfactory reconditioning of the many electric motors submerged seemed to be to wash them in warm fresh water and then bake them. But few were permanently damaged.

At the time of the flood the gas for heating the coke ovens was shut off and left off about thirty to forty-eight hours. The flood waters entered the stack canals through the air box covers. This caused sudden generation of large quantities of steam, which on one battery went up the stack, while on the other due to the stack canal being completely flooded it went into regenerators and up through the heating flues and raised the inspection flue covers. Brickwork around the regenerators, as well as around the flue inspection caps was opened up. During the flooding, steam and flames coming from flues caused great hazards to the men on top who were bleeding to atmosphere the gas being made. The next night and the following day, water gas was turned on to heat the ovens. At that time they could have been put in operation if there was electric power. On October 3d, or twelve days after the flood, pushing was started and in a few days the ovens were back to normal even to the extent of burning producer gas.

As the flood waters came in, the two producers which were in operation were hurriedly taken off the line. Men were standing in waist deep water when the last blank was pulled and were exposed to flying glass and roof sheets. Water raised to level of ash pans. The original fires were kept by careful nursing for two weeks, when they were put back to feeding the ovens.

One coal bridge was blown crabwise along the track about 500 feet when it collided with the other one. The land end of this second one held while the river end was carried thirty-five feet and came to a stop at end of dock with one wheel on verge of going off the track into the river. These have both been saved without serious damage. The bridge which first blew away jumped the rails when it collided. This bridge was ready for use within a few days, but there was no power for it. Both are now in operation.

Messengers and runners were used to convey messages and orders in the plant and between various departments of the company. This kept up for about a week. In shortly more than two weeks, when electric power was fairly safely restored and motors and controls reconditioned, the many functions at the manufacturing plant were almost normal.

The men, the public in general, various equipment concerns, and nearby gas and coke companies did their utmost in helping through this trying period. Great examples of personal courage, perseverance, willingness and imagination were common, and many times the seemingly impossible was accomplished.

PROVIDENCE, R. I., Oct. ..—Its gas holder destroyed, engineers needed, no telegraph or telephone communication with which to reach the needed assistance, the Providence Gas Company broadcast its troubles over the ether the night the hurricane swept the upper Atlantic seaboard.

Radio calls for "Koppers Company", followed by a brief statement of the needed assistance, were picked up by a Koppers man in Boston and relayed to the main office in Pittsburgh. The message was rushed to the Bartlett Hayward division in Baltimore, the nearest point in the Koppers organization from which the proper men could be dispatched. W. F. Perkins, head of the division, was able to reach three of his gas engineers, one in Albany, the others in other eastern cities. By morning the three had fought their way through and were on the job in East Providence.

Within five days, work of constructing a new gas holder was under way, to be completed within 90 days. It will be a 300,000 cubic foot, center type column waterless holder, fabricated in the Baltimore plant of Koppers Company. The destroyed holder had 100,000 cubic feet capacity.

Research and Recovery in the Gas Industry

by

Prof. Erwin H. Schell

Massachusetts Institute of Technology
Cambridge, Mass.

PROF. ERWIN H. SCHELL

TRUE recovery in the gas industry is not a matter of the business cycle, of prosperity after depression, of good times after hard times. Nor is true recovery a matter of quick turn-about, of radical remedy, or of revolutionary change. I cannot construe true recovery as a design of days, of months, or of a business season.

True recovery, if it comes, may even require a decade before its presence is generally recognized, and such an interval of time may bring many changes in present executive personnel.

It might seem, therefore, that I should address my remarks to the younger executives, to those who will be in command when this period of renewed advance may once more flourish. Yet I shall turn instead to the older group, to the elder statesmen as the focus for my remarks. I wish to talk to those men whose work in the active forefront of affairs may be well nigh over, but who are today in those places of highest responsibility which their vision as well as their work has earned for them. I am concerned to lay my words before those leaders of your industry, whether chairmen of boards, directors, presidents or general officials who have reached that stage in their career where their primary objective is that they may in some way contribute to the perpetuation of those establishments and that industry which they have helped to rear, and which, to them, has brought deep satisfactions and a measure of achievement, both past and present.

I am particularly happy to address this group for I am convinced that at this stage of the industry's development, you, more than anyone else, are in position to assure the return of true recovery,—to accomplish that all-important long-term objective,—the establishment of the gas industry upon an accepted plane of leadership in the eyes of investors and bankers, as well as of employers and communities.

The topic assigned to me is that of Research and Recovery and I shall begin by telling you that which you already well know.

First, may I assure you that I am not unmindful of the fact that the gas industry was born out of research and has remained a creature of research since the beginning. The carbonization of coal in enclosed vessels, the water gas reaction and the simple water seal are all products of the early scientific laboratory while the later research work which was spent upon removal or minimizing of impurities such as ammonia, hydrogen, sulphide, sulphur compounds and the like, has now found its way to international acceptance by regulatory bodies throughout the world.

More than this, I should speak at once of the splendid work now being accomplished in individual company laboratories as reflected by the papers presented at this section. Again your Association Laboratory has many achievements to its credit, not only in the form of special investigations which have eventuated in reports, but in the organization and issuance of manuals, the publication of approval standards and the active collaboration with many special research committees.

Even more noteworthy is the active collaboration existing between the several sections and the many committees of your association to the end that new developments may most easily become widespread. The close relationship existing between the manufacturers of gas appliances and equipment and the producers of gas is equally commendable and reflects a broad approach to the problem of the continued well-being of your entire industry.

If I may judge from the records of your past proceedings, you have heard something of the need of additional research. Indeed, there would seem to be no branch of your activities but what is clamoring for increased appropriations in order that the frontiers of knowledge in their field may be further extended. This is indeed a healthy condition and I do congratulate you. Yet it was not of these achievements that I have been called upon to speak.

True recovery in the gas industry will, I believe, ask even more, and to make my position clear I should point out certain aspects of research which perhaps have received less than their due of recognition. First, I should recall that research has itself been progressing with rapid strides. Methods of investigation are far in advance of their predecessors and while it is true that we are only beginning to emerge from the period of early development in research, yet we are well ahead of the practices which were first considered effective.

In brief, we have progressed through four stages: those of sporadic invention; of independent investigation; of organized experimentation and finally, of what I should call consolidated research. These titles are almost self-explanatory. You are doubtless familiar with each, although the last form is of comparatively recent origin. You are, I am sure, familiar with the sporadic invention, often the product of careful and patient effort on the part of an executive, employer, or a natural-born inventor. Many industries have early profited by such developments. Indeed, the early roster of valuable contributions contained far more from this source than from more regulated investigation. The independent investigator, whether in laboratory or shop, who earned his salary through his constant application of training and ingenuity in the

Presented before Technical Session at A.G.A. Convention, Atlantic City, N. J. October 11th, 1938.

perfecting or conceiving of developments, brought to many companies their first experience in the areas of research and did much to mark the research worker as an individualist who was somewhat queer and assuredly different from the run of his fellow-men.

Soon, however, it was discovered that research could be organized and allocated in sub-divided form to collaboration specialists who thus could contribute to the progress of each other and, by so doing, achieve a result which no one could hope to attain single-handed. With this finding, research laboratories blossomed into full-fledged structures which bore considerable similarity to other operating departments.

At this point, however, research came upon a degree of difficulty. Like a precocious child, its existence was a point of pride, but its utterance a cause of some concern. No one could tell what might come out of it. Moreover, research as erroneously reflected in the popular press was too often viewed as a thing of revolutionary character,—a roistering sort of activity which gave no heed to invested capital but which dispensed obsolescence with a carefree hand. Indeed, research was held to be the last stand of adventure in industry, —a sort of scientific musketeer who stormed at the bastions of conservatism and threatened to knock down established ramparts upon little or no provocation.

Then began the competitive race for the new idea. Laboratories multiplied and simultaneous investigations proceeded apace in the hope that the first to succeed would win the pioneer's profits.

So we are now witnessing the advent of a different era,—the era of consolidated research in your industry. This change has been a gradual one—so much so that its coming has been largely unnoticed. In fact, its newness comes from the assembly of factors which in themselves are of considerable age.

Consolidated research has five characteristics of particular significance:

First, the precise objectives of the research program are initially specified,—not by the research organization, but by the administrative body, and are in accordance with a predetermined plan of development that prepares for a gradual advance of all interests for whom the administrators are trustees.

Second, the research program is of a sort which incorporates a three to five to even ten year interval. It contains a comprehensiveness and scope which includes all fundamental activities inherent in the industrial process, including merchandising.

Third, the research program is carried forward for the entire industry and enjoys the active cooperation and support of all workers. As a result, benefits are distributed to all.

Fourth, the research program, after its definition, organization and authorization, is cooperatively financed by a system of weighted payments from members which may take the form of an initial endowment or a series of periodical payments extending throughout the period in question.

Fifth, the research activity may be organized in proximity to other research organizations of a long-standing nature, whereby counsel and auxiliary assistance can be provided, if called for.

Clearly such a program, properly incorporates past and present researches previously under way, as well as consolidates the findings of non-competitive members again for the benefit of all.

Perhaps the most vital characteristic in consolidated research is that of preparing the initial schedule of objectives. Preferably, this is accomplished through the appointment by a suitable committee of the elder statesmen of the industry, of a qualified individual or professional organization to prepare a proposal to be submitted for review and approval. The degree of care with which this plan is organized is the first prerequisite of success. Upon its final acceptance rest the later activities of financing, organization and operation of the research work itself. Periodical reviews of accomplishment are of course essential.

A word should be said in support of consolidated research as a conservor of present capital investments. In the field of telephone communication, an important area of investigation at the great Bell laboratories has been that of increasing the number of messages within a given cross-section of conductors in order that enclosing conduits need not be renewed as traffic grows. I am told that such research has enabled the greatly increased loads met with in our large cities to be cared for with very little replacement of original conduits. In transportation, the trackless trolley has brought lowered operating costs without the obsolescence of existing power facilities, while the research in the lighter metals and in Diesel engine design has brought the streamlined train whereas the monorail and the electrified form of traction have faced delay due to the obstacle of a higher capital asset obsolescence.

There is no reason to assume that the same will not hold true in the gas industry. True research of the most vigorous sort may be directed upon each element of your process from raw material to the ultimate consumer, with the specified aim of effecting lower unit-costs with a minimum of capital expenditures. With greater care in the initial specifications for the investigations to be undertaken, research may become evolutionary rather than revolutionary.

In such studies, revolutionary discoveries may be made and if their rate of return justifies the investment, they cannot but be welcomed. And their acceptance will be increased when it is clear that they offer advantages which evolutionary development cannot provide.

The deep truth is that the opportunities for improvement through research are so infinite in scope that no harm can come through the directing of inquiry toward those channels which will yield most fundamental benefits with least immediate sacrifice.

Obviously the gas industry has been extraordinarily fitted to undertake consolidated research due to the localized and non-competitive nature of plant operation. While the plan has proved successful in industries whose members are in competition with one another, it has even greater potency where this characteristic is absent.

Finally, it should be clear that consolidated research depends for its success upon the strong support of broad-visioned men whose chief interest has become the perpetuation of the industry as a whole. Such a program is not a plant program. It is an industry program, conceived on the widest and yet simplest lines, and currently watched over by those who have that quality of disinterested loyalty to the industry which makes for long-term major accomplishment to the benefit of all.

The long experience of the gas industry, its early and continuing facility in research, its active and effective trade associations and its personnel of loyal and devoted research men, engineers and officials and its active research programs provide completely the basis for an ever-greater furtherance of this far-reaching development.

In all sincerity, I say to you that I know of no other procedure which offers such assurance of recovery to your industry as does consolidated research.

(Continued on page 67)

What the World's Fair Means To Industry

By

Floyd L. Carlisle

Chairman of the Boards of
Consolidated Edison Company
of New York, Inc.

and

Niagara Hudson Power Corporation
New York, N. Y.

FLOYD L. CARLISLE

IN discussing the subject assigned to me I would like to touch briefly on a few important facts relative to the economic system we are living under and how these affect our business.

When all is said and done we come back to the simple truth that the economic well-being of modern society is primarily dependent upon the volume and velocity of production and consumption of goods and services. The World War greatly stimulated the production and consumption of all classes of goods and services and its ending was followed by a period of greatly diminished turnover. This, in turn, was followed by a period of abnormal activity, and then by the great depression. The depression was the inevitable result of the breakdown of international credit, necessitating a world wide readjustment of currency values and debts. Its effect was a tremendous drop in the volume of goods and services. An era of intensive nationalism set in and barrier after barrier of tariffs, trade restrictions and currency limitations was set up. The folly of this is now being appreciated —in this country, at least. Where it will lead, elsewhere, no man can tell.

From the time of the formation of our government, and indeed from the initial European settlements in North America, the economic concept and practice took for granted here the private ownership of land, factories, stores, shipping, and the private operation of every form of business activity. State and national laws encouraged this private economy from which has resulted this country's unique contribution to wide production and enormous consumption in every field. Under our systems of laws and ownership, private business is the only producer of wealth. All government activities and all government expenditures rest solely upon the productivity and profits of private business. Wages, taxes, interest, dividends are paid only from this source. There is no other source.

As I have said, the degree of prosperity of any country is primarily a matter of the volume and velocity of the turnover of goods and services in that country. Before the World War we had no unemployment problem, and indeed we absorbed most of the unemployment of Europe by encouraging immigrants, many of whom were later naturalized and became permanent citizens.

Economists may explore all the factual material available, but in the end it will be found that the World War was the first direct cause of our present economic unbalance and problem of high unemployment. We have tried to solve this unbalance and this unemployment problem by immense government public works and spending programs. The theory in the beginning was that the emergency would be overcome in this way, and that in a reasonable period private business would again support the cost of government and provide for the living of our citizens.

In 1936 the volume and velocity of turnover sharply increased and there was a genuine and well-merited expectation that recovery was at last at hand. In 1937, however, the volume and velocity fell off with great rapidity, resulting in diminution of profits and very sharp increases in unemployment. At the present time volume is again increasing in certain lines, and the searching question is in every man's mind—is this upward movement real, will it last, and is it possible to prevent a recurrence of 1937?

Every person directing a business enterprise in the United States should devote his efforts to increasing production and distribution along the sound lines that have built up American business. Many aggressive sales campaigns have been started. Those that are based upon low prices and large sales are succeeding. There are many obvious things that the government can do to help this program, but in any event the program should be undertaken. The natural inclination of people is to consume more goods and to enjoy the innumerable material things which mass production has made possible in America. This is a great force, ever present. Every function of business and government should be subordinated to the one major problem of increasing production and distribution. Whatever hinders this result should be abandoned, and whatever helps it should be encouraged.

The manufactured gas industry is one of our basic business enterprises. It was organized over 100 years ago and has adapted itself to the changing technology and demands for its services, and has rendered an outstanding service to the people of the country. It has provided a fuel for all kinds of purposes, in most convenient and most usable form, and has done so at prices that made the economic uses expand for the benefit of the whole nation. Although for many years a severely regulated industry, it has furthermore been exceedingly competitive because such fuels as coal and oil are constantly available as substitutes. It has seen many cycles of change and has soundly adapted

Presented at American Gas Association Twentieth Annual Convention, Atlantic City, N. J., October 10-13, 1938.

itself to such changes. The engineers and technicians of the industry have cooperated in the development of equipment with the result that extraordinary improvement has been made in the efficiency of appliances—ranges, water heaters, refrigerators, space heaters and dozens of articles for home and industry. The gas industry, if properly treated in relation to its competitors has a very great future in the many fields in which it is superior to other fuels. The management of the gas business in the United States has courageously faced the problems of the depression and, while revenues have fallen somewhat, they would have fallen much more except for the outstanding ability and ingenuity shown in the promotion of new uses and general sales.

The principal difficulty that the industry has encountered has been the tremendous increase in its taxes. The competitive industries such as coal and oil have not experienced the same drastic increase in taxes because they have not been classed as public utilities, although in a true sense they are all engaged in the primary business of furnishing heat. In the instance of the Consolidated Edison gas properties, taxes have risen from $5,700,000 per year in 1930 to $7,500,000 in 1937, an increase of $1,800,000 or 31%. During the same period gas revenues decreased by $9,000,000. The manufactured gas industry as a whole paid $40,000,000 in 1930, and in 1937 it paid $47,200,000, or an increase of 18%. During this period the sales of gas to consumers decreased by $54,500,000. More and more it is being recognized that, in our national economy, taxation must be adapted to the particular business upon which it is imposed, and that where taxes produce a decrease in volume and turnover the result is healthy to neither the industry nor to the whole national prosperity. To secure a rising volume and velocity of turnover is the heart of the restoration of prosperity in the United States.

I believe that the next decade will see a tremendous rebuilding and new building in the field of housing. In this field gas for heating purposes is superior to any other form of fuel and the use of modern insulating materials will, in my judgment, inevitably lead to a tremendous expansion of our business. A modern dwelling can be built cheaply enough so that the living cost as against the older structures makes it sound economically.

The research laboratories of industry were never so well-equipped

and organized as today. In almost every field of manufacture, new, improved and cheaper processes of production are being developed. It is but a few years ago since the radio emerged from the laboratory. Today it is the commonplace in practically every home. When I started in business the automobile had never been heard of, and today over twenty-eight million automobiles are daily operating in the United States alone. Rayon is a lusty youngster among her sister industries—a foundling of the laboratory. Television is approaching its commercial stage. There is no limit to the products of science, and research is constantly adding new frontiers.

I believe the upward spiral of business is again well under way. The cloud of a European war is probably receding. Many new developments have been delayed due to this fear. The great business mechanism of America is able to produce vastly more goods than are being consumed. We of the Western world have had as our principal distinction the development of mass production, and the people of this country consume more goods and services per individual than any other.

The World's Fair to be held in New York City next year will be the most dramatic presentation ever made of this contribution to world economy. Never before in history has so much imaginative talent—of architects, artists, designers, builders, sculptors, painters—been marshalled for the entertainment and education of the people of the world. The totalitarian governments will be represented with their conceptions of government in business. American private industry will graphically display its contribution and show a picture of its future. Laboratory and research will be stressed as never before. The gas industry will have its own exhibit, and in it will be the largest gas flame ever created by man. Consolidated Edison will show a complete replica of the Metropolitan area in a diorama a block long and the height of a three-story building, animated and with sound effects, to take the visitor through the cycle of a 24-hour day, showing how the companies' services enter into the life of the City. The use of appliances of every kind will be shown to the best advantage.

It is a matter of great gratification to those of us connected with the New York World's Fair that this industry has responded so completely. Not only was our industry one of the first to announce its intention to participate, but the gas exhibit was the first to break ground for its building. Gas will have a tremendous part in the Fair. It has been designated by the Fair authorities as the fuel for cooking, water heating and space heating in all the buildings operated by the Fair Corporation, and in all the permanent buildings that will remain after the Fair's close. The quantities of gas used at the Fair will be enormous and the public will gain the impression that the industry is modern, aggressive, and alive to its future opportunities.

Standard Gas & Electric Co. Elects New Officers

Bernard W. Lynch, president of Standard Gas and Electric Company, announces important changes in that company and in Public Utility Engineering and Service Corporation, the service company for the Standard Gas and Electric Company system.

At a meeting of the board of directors Victor Emanuel of New York was elected a director of that company to succeed Georges F. Doriot, who resigned as a member of the board. Mr. Emanuel was also elected chairman of the board of directors of the company.

The board of directors of Public Utility Engineering and Service Corporation also met today and accepted the resignation of Mr. Lynch as president and director of that corporation. William J. Hagenah of Chicago was elected president and director to succeed Mr. Lynch.

According to a statement by Mr. Lynch, these changes have been brought about as the result of the recent emergence of Standard Gas and Electric Company from reorganization proceedings under Section 77B of the Federal Bankruptcy Act, and on account of negotiations now pending for the re-acquisition by Standard Gas and Electric Company of Public Utility Engineering and Service Corporation, as a wholly owned subsidiary. The latter corporation is now a mutual service company rendering services to the public utility operating companies in the Standard Gas and Electric Company system.

Rate Trends

by

Donald A. Henry, Chairman

Stone & Webster Service Corporation, New York, N. Y.

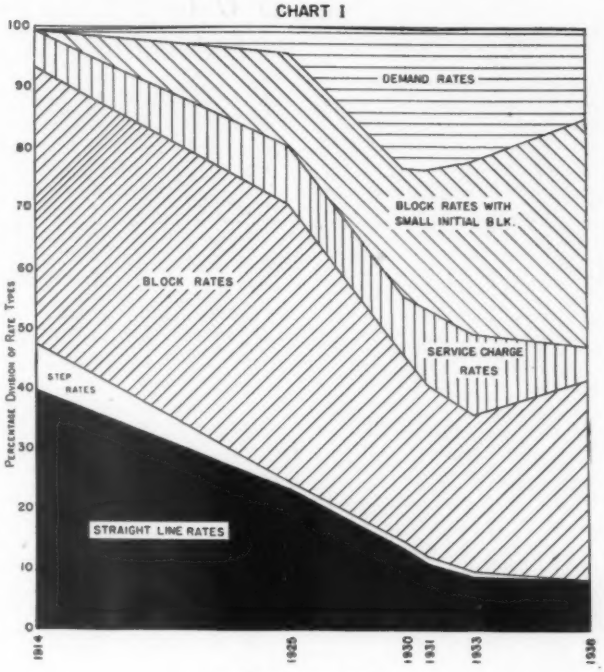
THE honor is mine, as Chairman of your Rate Committee, to present to you the annual report of the 18th consecutive year of endeavor of that Committee. The committee now known as the Rate Committee was appointed originally in the year 1920 as the Rate Structure Committee. Volumes have been written, filled with fine spun rate theories but, after all, you and I know that the one important test of any rate is: DOES IT GET THE BUSINESS.

The Committee's earlier years included an exhaustive study of basic principles which culminated in 1926 in the issuance under the Committee's auspices of "Principles of Rate Making for Gas Companies." In that volume is presented a complete statement of the underlying principles of cost analysis which should determine the fundamentals of the rates upon which your business rests.

After these many years of work, your Committee concludes that, in general, rates which meet the test of proper adherence to the cost curve, likewise meet the just enunciated, all

Presentation of the Rate Committee before General Session at A.G.A. Convention, Atlantic City, N. J., Oct. 12, 1938.

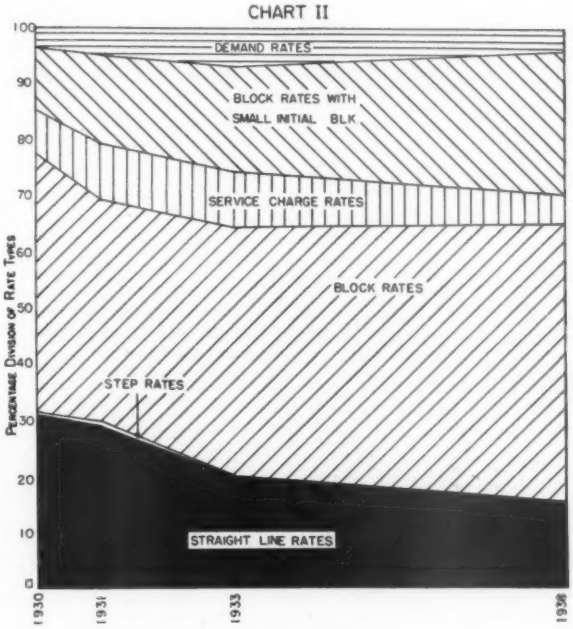
CHART I



MANUFACTURED GAS RATES

THE HEIGHT OF EACH ZONE REPRESENTS THE PERCENTAGE OF EACH RATE TYPE AT THE DATE TABULATED — THE TOTAL AT EACH DATE BEING 100%

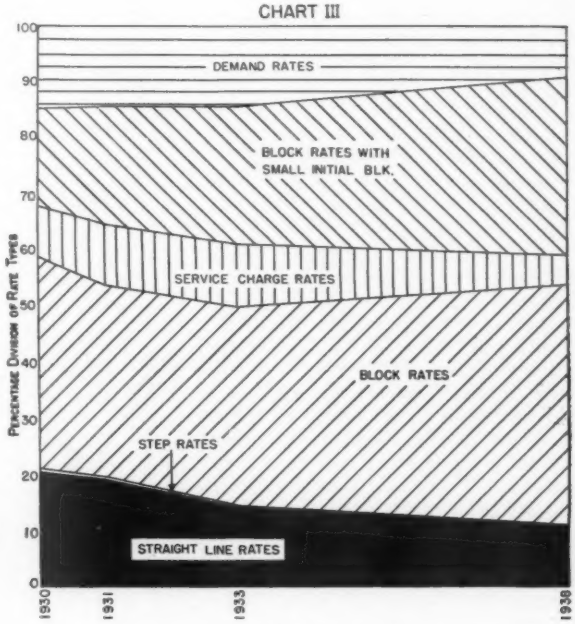
CHART II



NATURAL GAS RATES

THE HEIGHT OF EACH ZONE REPRESENTS THE PERCENTAGE OF EACH RATE TYPE AT THE DATE TABULATED — THE TOTAL AT EACH DATE BEING 100%

CHART III



ALL GAS RATES

THE HEIGHT OF EACH ZONE REPRESENTS THE PERCENTAGE OF EACH RATE TYPE AT THE DATE TABULATED — THE TOTAL AT EACH DATE BEING 100%

important, practical test. This is not to say that all rates must show a slavish adherence to exact cost curves, nor that such rates would inevitably result in your securing the maximum coverage of your market. Therefore, your Committee, while continually urging over the years the necessity of cost analysis, has likewise continually urged attention to those practical considerations which infuse into the lifeless form of a theoretically correct rate the warm blood of humanity.

The report of the Committee this year is devoted in part to a survey of progress. Such a survey must be made periodically if we are to profit by past experience and direct our future so as to avoid the mistakes of the past which subsequent experience reveals. In the words of my illustrious ancestor, Patrick Henry—"I have no way to judge the future but by the past, no light to guide my footsteps save the light of experience."

What then does this survey of the past reveal? If you will turn to the Rate Committee Report you will find a table showing the percentage relationships of different types of rates over the past 24 years. Six types of rates are there analyzed. Though the figures speak for themselves they also tell a story—a story of the effort of the gas industry to humanize itself. You will note the rise and fall in prevalence and popularity of different types of rates—and sometimes the complete disappearance of a rate form. Study these tables and charts and their story will be very plain.

But there is another kind of story which may be read from our rates—the story they tell to our customers. Do your rates talk to your customers—of course they do—just as surely as your salesmen do. What they say is up to you.

We may liken a rate to a human being—a human being which we as gas company rate men and executives create. Correct attention to fundamentals provides the firm, accurately articulated, skeleton which, clothed with the flesh and blood of practical philosophy and fair dealing, results in a personality—a personality that reflects your own and your company's attitude. None of us would care to shake hands with a skeleton—neither do our gas customers understand or want to deal with a cold and lifeless rate structure. We confine our human contacts to the warmly alive human being—whose features we recognize and whose characteristics are the same as our own. Why therefore should we not try to make our rate structures look as familiar to our customers as an old friend by moulding the necessary basic facts into forms familiar to them—in other words—make them talk the customers' language. It can be done.

What do our rates say in these conversations with our customers? Here comes one of the old Straight Line Rates—a little decrepit now from the many hard knocks he has had but still erect and challenging—yes he is the challenge of the gas industry to its customers. He says, "Here I am, a little stupid maybe, but still inflexible. Buy my service if you will but the more you use the more you pay. I dare you to make full use of gas service." Not a very pleasing person to meet. He was a doughty warrior in his day but I'm afraid he hasn't long to live.

Whom do we see next? Well if it isn't our old friend the Service Charge Rate! *Our* friend—yes—but is he the customers' friend? His story runs about like this: "Well I've analyzed my costs and that analysis tells me that as soon as I connect you to my lines you represent a certain out-of-pocket cost to me. I propose to assess you that cost each month whether or not you use any of my product. True, if you do use it I will sell you what you want at exactly what it costs me to make it, but I don't care whether you use it or not. When I get out of you my readiness-to-serve cost, as represented by the service charge, you can take it or leave it." At least he's honest about it but he doesn't have much attraction for the customer. He will deal as fairly as a judge—and has just about as much popular appeal.

But don't we have anybody representing the gas company to the customer who will present any less uncompromising attitude than these two fellows? Let's see—here's another—the Small Initial Block Rate—a gas customer is talking to him.

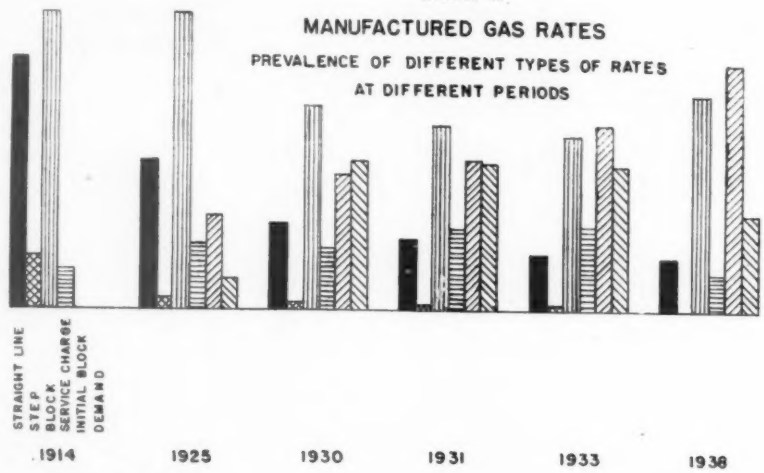
"Mr. Rate, I'm living in an apartment and want to cook with gas—I won't use much gas. Later on I may move into a house and there I'll probably do quite a lot of cooking, I shall want hot water service and likely re-

(Continued on page 76)

CHART IV

MANUFACTURED GAS RATES

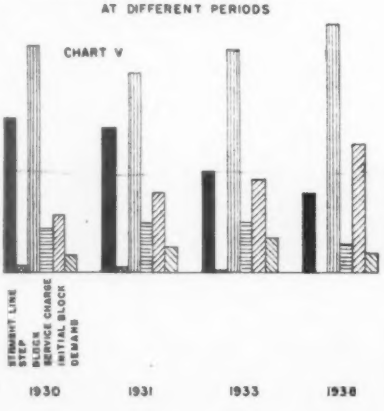
PREVALENCE OF DIFFERENT TYPES OF RATES AT DIFFERENT PERIODS



NATURAL GAS RATES

PREVALENCE OF DIFFERENT TYPES OF RATES AT DIFFERENT PERIODS

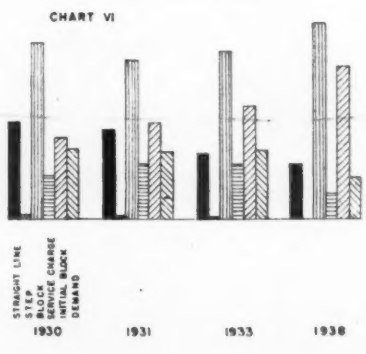
CHART V



ALL GAS RATES

PREVALENCE OF DIFFERENT TYPES OF RATES AT DIFFERENT PERIODS

CHART VI



Geophysical Methods of Exploration

By
Dr. J. Brian Eby
Geologist, Houston, Texas

THE word geophysics means literally, "the physics of the earth," and the science of geophysics is therefore that which treats of the study and measurements of the various physical properties of the earth. The broad and general study of the elastic, the gravimetric, or the magnetic properties of the earth as a whole belongs to the general science of geophysics. The detailed application of this science to rocks of shallow depth and in small areas for the purposes of ascertaining data on their character and structural attitude, gave rise to the present well-known science of "applied geophysics." The word "geophysics," therefore, as used throughout the remainder of this article is in the restricted sense, or as applied to geophysical research for mineral accumulation or favorable rock structure. Since the discovery of enormous new quantities of oil, gas, and sulphur has been by far and wide the principal benefaction of geophysics in the United States, this paper will refer only to geophysical methods employed in the search for these particular minerals.

Up until 1923 oil and gas was found in the United States by drilling at locations picked either on geological or wildcat considerations, or various combinations of the two. The geologist used his knowledge of rock formations, surface oil or gas seepages, previously drilled deep holes and similar criteria for making his locations. The wildcatter used his hunches, his favorite "jeep" or wigglestick, or his immediate financial circumstance, for making his locations. The increasingly difficult problem of finding new fields in the coastal area of Texas and Louisiana, however, was fast approaching the point of desperate vexation. The flat, limitless, thousands of square miles of marsh and prairie offered little for either the geologist or wildcatter upon which to predicate new oil fields. The prolific hundred million barrel oil fields of Spindletop, West Columbia, Humble and Jennings in the coastal area, discovered as early as

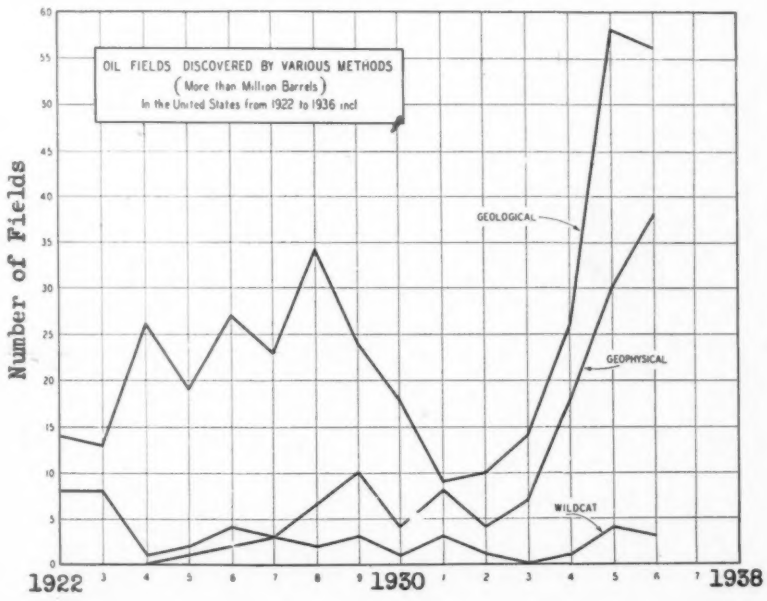
DR. J. BRIAN EBY

1901, made it clear however that the entire Texas-Louisiana gulf coast was an oil-bearing province of enormous potential value.

Since geophysics was introduced in the United States in the Gulf Coast area and became so eminently successful there, it is necessary to state briefly the geologic character of coastal structures and oil occurrence. Oil and gas is found largely to occur in sands found around or overlying masses of salt, commonly called salt domes. These salt domes are from one-half to six miles in diameter and are oval to round in horizontal pattern and extend from unknown depths. In the case of the Louisiana, "Five Islands," the salt reaches the surface of the earth. Other domes are flat-topped, usually capped with lime and anhydrite, called "caprock" sometimes, carrying sulphur. These domes extend from a few feet to unknown depths below the surface. The majority of the salt domes, especially the newly found ones, give no surface evidence of their existence. It became, therefore, the prime problem of the exploration scientist to find these hidden, scattered and widely isolated, salt domes. It was to this particular problem that geophysics adapted itself so admirably.

Geophysical Methods

The principal methods of geophysics are those known as the refraction and reflection seismograph and the gravimetric measurements of the torsion balance and gravitimeter. Various other methods have been or are being used such as the magnetometer, electric resistivity measurements, and the analysis of soil and subsoil gases. The vast majority, however, of all commercial discoveries of oil and gas by geophysics so far has been made by the seismograph.



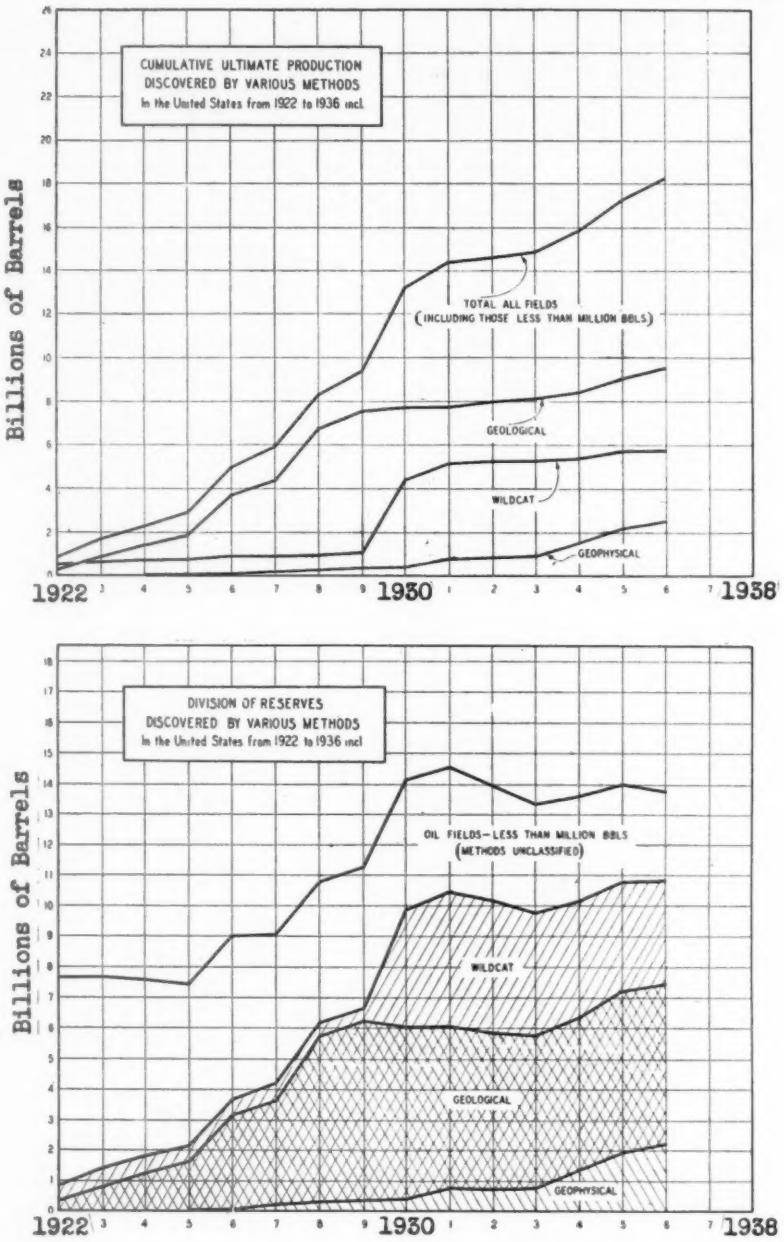
Presented before Natural Gas Department, A. G. A. Convention, Atlantic City, N. J., Oct. 10, 1938.

Refraction Seismograph

The refraction seismograph measures accurately the speed of an artificially excited seismic wave (sound wave) through the various rock strata below the surface, between the origin of the shock and the seismograph recorder. As early as 1850 English physicists were measuring the speed of sound in various types of rocks on the surface of the earth, such as dry sand, wet sand, granite, etc. In succeeding years, scientists in many countries made similar observations. Professor R. A. Fessenden, of Boston, from 1913 to 1917 experimented with velocities measured between boreholes, or speeds underground, a development in which he was a pioneer.

The earliest attempt, however, to use the refraction seismograph for examining subsurface rocks from the surface was made by Dr. L. Mintrop, who as a student of Professor Wiechert, at Goettingen University, Germany, carried out the experiment in 1908. The results were first published in the mining magazine "Gluckauf," Essen, Germany, in 1909. Following the period of the World War, Mintrop turned his attention to the examination of subsurface rocks by seismograph for commercial purposes. By this time he had proved conclusively that all rock strata, irrespective of depth, would, if properly excited, carry an elastic wave that could be measured at the surface and that these velocities could be analyzed by the ordinary time-distance graph.

The first salt dome experience for the seismograph was in 1920 at the Wietze dome near Hannover, Germany. Here Mintrop conclusively proved his method and followed it up by the discovery of the hitherto unknown Meissendorf salt dome near Wietze, marking the first commercially important discovery by the refraction seismic method.



The method was brought to the Mexican "Golden Lane" field in March, 1923, and to Oklahoma in July, 1923. The Gulf Production Company, largely through the efforts of L. P. Garrett, brought seismographs to the Gulf Coast in the spring of 1924, and the discovery of Orchard dome by that company in June, 1924, marked the first United States seismograph find. The organization, by E. L. DeGolyer, of the Geophysical Research Corporation, led numbers of American scientists into the practice of geophysics. Many oil companies, independent geophysical companies and consulting geophysicists took the field. So keen was competition and so fruitful salt dome and oil field discoveries, especially in the coast, that in this region alone for the period of 1924 to 1931 inclusive the seismograph expense budget averaged from eight to ten million dollars annually.

The refraction seismograph is designed to record photographically the incoming seismos (elastic) waves from a shock four to six miles away. This shock is created by the explosion of 500 to 1000 pounds of dynamite. As the earth shock affects the distant seismograph a mirror affixed to the seismograph is likewise set in motion. By reflected light rays from this mirror an image of the disturbance is impressed on a sensitized rotating photographic strip film, called seismogram. Time lines in hundredths of a second, and the instant of explosion carried by radio, are also impressed on the seismogram. The air sound shock is also recorded which permits an immediate determination of distance between origin of shock and reception. With this information seismic, or underground, velocities can be computed.

The velocity of sound through salt is from 15,000 to 16,000 feet per second, as against 6,000 to 9,000 feet for

normal sediments. Refractions over a salt dome therefore reveal abnormally high speeds, giving rise to the popular expression "a fast shot," a term that became a by-word in the exploration business of oil and gas. Over fifty salt domes and oil fields in the Coast alone have been found by refraction seismograph and hundreds of millions of dollars worth of new oil and gas added to the national wealth by this method.

Reflection Seismograph

Starting as early as 1926, American geophysicists, led by Rosaire, McDermott, Karcher, Petty and McCollum, experimented with the idea of reflection seismograph exploration. The principle in general consists of sending an impulse or shock vertically, or nearly so, into the ground and recording reflections of energy from any particular plane or bed competent to send back such a reflection or "echo." The difficulty of identifying reflections was made easier by the invention of multiple recorders, namely taking several seismograms on one photographic tape.

The invention and perfection of reflection shooting marks the greatest single achievement in seismograph exploration since the original development of the method. It was a long and difficult task, however, and did not reach the peak of unanimous approval and success until 1934. It was this year that two outstanding oil fields, Hastings, in Texas, and English Bayou-Gillis, in Louisiana, were brought into production as a result of prospects outlined by reflection shooting. From 1934 to the present, this method of exploration has been carried over the whole coast, the Midcontinent, California, Illinois and other parts of the United States. By a series of brilliant oil field discoveries it has established itself firmly as one of the most potent arms of the exploration industry.

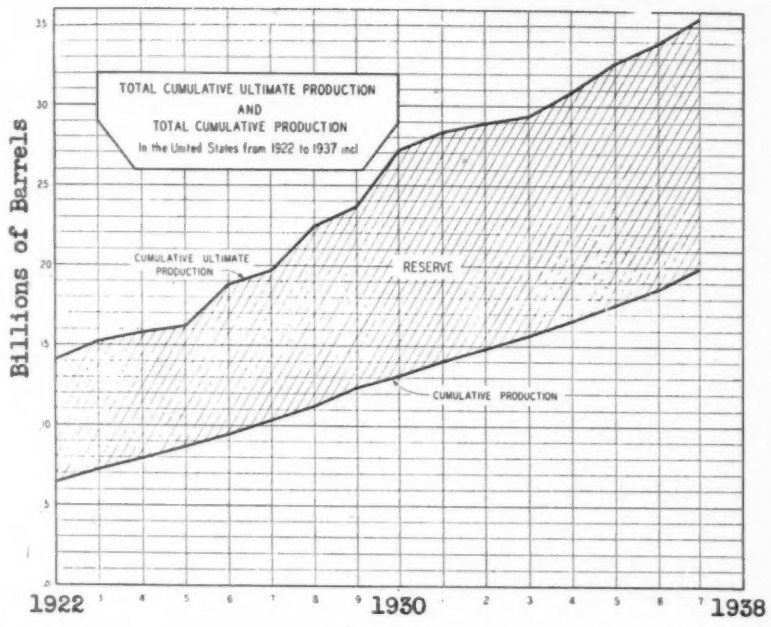
In the Gulf Coast area it is seldom that a specific rock formation can be mapped by reflections. This is true because there are no well-defined strata or hard rock beds down to a depth of from 12,000 to 15,000 feet. It has been found, however, by careful reflection shooting that specific dips can be ascertained and mapped at succeeding stations. Since the formation giving this reflection is not known, or even identifiable in subsequent drilling, these reflecting beds are called "phantom" horizons. In other sections of the United States definite beds can frequently be mapped over many square miles with as much finality as core-hole drilling.

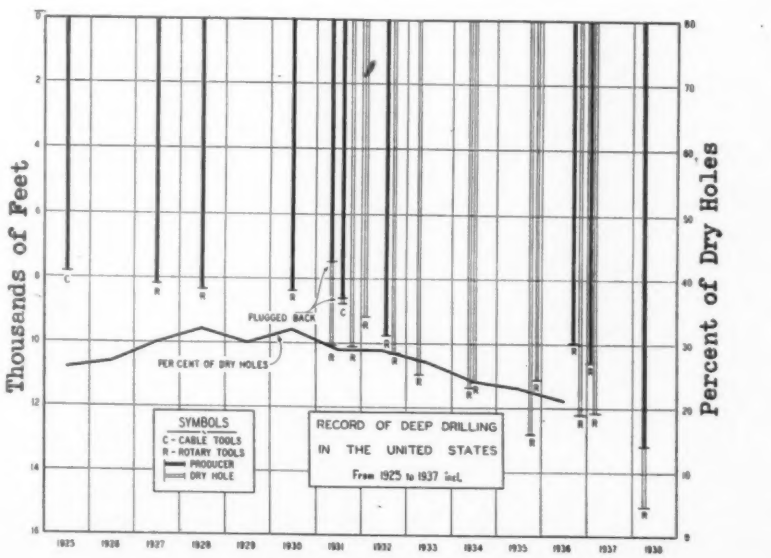
Torsion Balance

Gravity methods of oil and gas exploration have had a long and successful usage with the industry. Most noteworthy of course is the method of the well-known torsion balance. This machine has a long and interesting history and ranks next to the seismograph in the matter of actual commercial discoveries. Lesser known perhaps are the pendulum and gravitimeter, both of which, however, have been widely operated.

The torsion balance as used today was invented in principle in the early nineties by a Hungarian professor, Baron Roland V. Eötvös at Budapest. The balance that he designed was intended to measure the rate of change of gravity in a horizontal direction. His first printed reference to the torsion balance appeared in Wiedemann's Annalen, in 1896. Professor Eötvös again called attention to his method at the International Geodesy conference in Budapest in 1906. It was not until during the War in 1916 that Professor W. Schweydar, of Potsdam, Germany, carried out actual salt dome investigations with the torsion balance at the Wathlingen dome near Hannover, and his published accounts in 1918, that attracted real attention to the method.

In 1920 the Amerada-Rycade companies, through E. DeGolyer, sent





Dr. Donald C. Barton to Budapest and brought two of the machines to the Texas Gulf Coast in 1922. Dr. Barton's discovery of the Nash dome in 1924 marked the first find of the torsion balance in the United States and firmly established the method as a fundamental means of exploration.

The torsion balance is a system of two weights held in delicate suspension by an exceedingly fine wire. The two weights are separated vertically by about 18 inches and horizontally by a bar about 12 inches long. The one weight is affixed to one end of the bar and the counterweight suspended by a second fine wire from the other end of the bar. Since gravity is a function of the mass of the underlying rocks and the distance separating them from the balance weights, as the torsion balance system is moved to successive field stations minute gravity differences will be detected. Shallow salt domes introduce a large gravity anomaly and hence offered a relatively conspicuous target for early torsion balance exploration. Had it not been for the coincident development of the more rapidly moving seismograph, the torsion balance would have eventually found most of the salt dome structures discovered during the early geophysical history of the Gulf Coast.

The effect of salt near the surface, or above 2,000 feet, is that of a "positive" or "maximum," meaning namely that shallow salt is heavier than the surrounding rocks. At depths below 5,000 feet salt is lighter than the surrounding beds and therefore acts as a "negative" or "minimum." This effect is expressed on torsion balance maps by the direction and size of the vectors, called "gradients." The gradient as plotted on the map is an arrow pointing directly towards the maximum increase in gravity. In a maximum picture therefore all gradients point to a common center, and in a minimum picture they indicate flight outward from a common point.

Pendulum

In addition to the torsion balance other types of machines have been successfully used to detect and measure the minute local variations in gravity. It is well known for example that the period of a swinging pendulum varies directly as to the effect of gravity. Special pendula have been designed and actually put into commercial usage for this type of exploration. In general, however, the equipment is burdensome and the method slow and expensive and has given way to more practical methods.

Gravitometer

The gravitometer, or "gravimeter," is another instrument designed to measure directly the vertical component of gravity and is now being widely used by exploration geophysicists. There are two principal types, the "spring" type and the "barometer" type. In the former instrument a weight is suspended from a firm frame by a horizontal sheet metal spring. Variations in gravity will affect the weight and spring accordingly and these can be measured by the usual means of optical amplification by lights and mirrors. In the barometer type, a mercury column is handled exactly as in an ordinary mercury barometer except the tube is sealed to prevent the effect of atmospheric pressure. The height of the column of mercury therefore will reflect the variations of gravity pull from one station to another.

Gravity work has been carried out in every oil-bearing province in the United States. The torsion balance has been the major instrument and the spring-type gravitometer of second importance. A number of oil fields and many favorable structures have been mapped by the use of gravity variations.

Magnetometer

The magnetometer, which has been used with considerable success in certain parts of the country, makes use of the fact that different kinds of rocks exhibit different magnetic properties. The earth itself acts as a huge magnet and the ordinary magnetic compass will always align itself in accordance with the general north-south direction of these lines of force. Where highly magnetized rocks lie on or close to the surface a sharp disturbance to the normal earths magnetic field will be observed. It is the province of the magnetic geophysicist to detect and map these anomalies and then interpret them in terms of geology and local rock structure.

The magnetometer has been especially useful in mapping buried granite ridges in West Texas and Oklahoma and igneous plugs in Arkansas, Louisiana and Mississippi. It has had wide application in many other sections of the Mid-continent and Rocky Mountain districts.

Electrical Exploration Methods

A vast amount of effort has been placed in various types of electrical methods of oil and gas exploration. The general principle involved is that of measuring the resistivity of a current through various rock strata and attempting to determine geologic structure from these data. As long as this type of exploration was kept on a horizontal plane, namely on the surface of the earth, insofar as oil and gas exploration is concerned, it met with great difficulties and indifferent success. However, as an outgrowth of these efforts, electrical surveying was turning into a vertical plane, namely in deep holes, and met with immediate success. This process of exploring the subsurface electrical properties of rocks is everywhere known as the Schlumberger system of well surveying. Electrical logging has reached such a peak of skill that, in many oil-bearing regions, it is required by the operator, just as coring an oil sand or examining the cuttings for fossils. It has been pointed out many times before that electrical logs have frequently revealed oil sands, wholly passed over, or missed, by the driller.

Soil and Gas Analysis

Newer geophysical methods of oil and gas explorations are constantly being tried out. Among the more notable of these is that of soil and gas analysis for the presence of hydrocarbons or gases (for example ethane) that might suggest the occurrence of oil or gas in commercial quantity. These methods are actually geochemical rather than geophysical and attempt to detect directly the presence of oil or gas, as against all the preceding methods which map structure rather than the mineral itself. The fundamental principle is that every large body of oil or gas will have sufficient natural leakage, or surface seepage, and that this escaping gas or residual hydrocarbon can be detected by careful chemical analysis. While this method of exploration is not new, it has many strong adherents and is now receiving considerable attention. Just how successful it will be remains to be proved but it does give much promise.

Geophysical Exploration in the United States

The use of geophysical instruments has spread to all parts of the United States that gives any promise whatever of oil occurrence. In recent years the development of the Illinois basin has been almost entirely due to the advent of reflection seismograph work. In California important new oil fields have only recently been added by the use of the seismograph. Even now far in advance of any indication of oil or gas, geophysics is being pushed into Alabama, Georgia and Florida.

(Continued on page 76)

NATURAL GAS DEPARTMENT

Why Not Eliminate The Waste?

by
E. F. Schmidt
Vice-President and Operating Manager
Lone Star Gas Company, Dallas, Texas

The argument has often been advanced that gas produced with oil and blown to the air is not waste because it serves the necessary function of bringing the oil to the surface. Even under such a liberal version of what constitutes waste it must be admitted that in the past, operations for the most part have at least been inefficient. Some of this gas wasted incidental to the production of oil may be attributed to improper well completions, but regardless of the cause or the justification advanced, the fact remains that gas blown to the air is waste from the standpoint of both the oil producer and the gas industry.

The remedy for this waste lies in the returning of the gas to the reservoir to remain until it is utilized. It has been definitely shown that the major portion of the gas reserves which are found in contact with oil can be saved for commercial consumption, and likewise that oil recoveries can be materially increased by means of procedures in operations which return the gas to the reservoir.

It would be asking too much of the oil producer to expect him voluntarily to return the gas to the reservoir after producing the oil unless his best interests are also served by such a procedure. Fortunately, it can be shown that the oil producer has much to gain from this procedure. There is ample proof of the fact that oil recoveries have been universally low under the usual methods of operation and that ordinarily these recoveries do not exceed 30 per cent, the average probably being no more than 20 per cent of the original reservoir content. While there have been some increases in ultimate recoveries of oil under proration and reduced gas-oil ratios (cubic feet of gas per barrel of oil) it is questionable whether ultimate oil recoveries generally will be greatly increased beyond those formerly obtained, if the only means employed to effect this improvement consists of restricting production rates. Oil recoveries cannot be greatly increased without partial maintenance of reservoir pressures so that the necessary energy to move the oil in the reservoir to the well bore may be continually available. It has been demonstrated that oil recoveries may be increased to as much as 75 per cent of the original reservoir content by intelligent pressure maintenance operations.

There are then three principal procedures that may be followed in the operation of oil and gas properties to eliminate the major portion of the waste of these natural resources: (1) pressure maintenance or repressuring in oil producing formations; (2) recycling of gas for the recovery of distillate; and (3) the storage of excess gas production in depleted reservoirs for future consumption. Under most circumstances any one of these operations scientifically and intelligently carried out will prove to be profitable.

In view of increased knowledge with reference to the economics of conservation and in view of the general public interest it must be predicted that unless the oil and gas industries move rapidly to eliminate some of the wasteful practices we may, in this era of regulation, expect governmental requirements to do that which we fail to do.

Abstract of Paper Presented before Natural Gas Department at A.G.A. Convention, Atlantic City, N. J., Oct. 10, 1938.

Federal Regulation of the Transportation and Sale Of Natural Gas in Interstate Commerce

by
Hon. Clyde H. Seavey
Acting Chairman
Federal Power Commission

Discussing the orders, rules and regulations adopted by the Commission for administering of the Natural Gas Act, Mr. Seavey said that the main purpose of the questionnaire sent to all companies and persons in the natural gas business was to assist the Commission to determine which companies are subject to its regulatory jurisdiction. In answering, no company will thereby waive any right it may have to contend that it is not subject to the Commission's jurisdiction.

Rate schedules have not been filed by a number of companies which are subject to the provisions of the Natural Gas Act, he said, and while the Commission will not take an unreasonable attitude with respect to such non-compliance, as in many cases there may be a reasonable doubt as to whether a particular company is subject to this section of the statute, "it should be clearly understood that any risk involved in a failure to file rate schedules as required by the law must be assumed by the natural gas company."

Prescribing a uniform system of accounts for natural gas companies is a vitally important duty imposed by the Natural Gas Act, Mr. Seavey said, and Federal Commission accountants are working with State commission representatives in developing such a system, following the same procedure as was used in drafting the uniform system of accounts for electric utilities now in use by 90 per cent of the electric industry. Realizing the heavy responsibility imposed upon utilities by the numerous reports required, and seeking to lessen this burden, the Commission intends to collaborate with State commission representatives in formulating an annual report form that will be satisfactory to both State and Federal commissions.

Résumé of Address given before Natural Gas Department at A.G.A. Convention, Atlantic City, N. J., Oct. 10, 1938.

When special reports are necessary from time to time and members of the Commission's staff may have to make engineering or accounting studies in the offices or operating areas of gas companies subject to its jurisdiction to obtain data or information necessary in hearings or investigations, far better results can be accomplished, Mr. Seavey said, by companies voluntarily furnishing the information sought. In such matters the cooperation of utility officers will not only expedite the work, but will save time and expense of the Commission and the companies.

Reviewing the various types of cases brought before the Commission and the principal issue involved, Acting Chairman Seavey said, in conclusion:

"In all of the cases which are pending before the Commission, as well as in the promulgation of general rules and regulations applicable to the industry, the Commission intends to proceed carefully and without any desire to bring about overnight any revolutionary changes in the industry. You may be sure that the Commission will be fair and impartial in all matters which come before it with a view to meeting its responsibilities to the consuming public and to the industry alike. Congress has reposed grave and far-reaching responsibilities in the Commission. I am sure that you will find the Federal Power Commission carrying out its duties under the Natural Gas Act in an altogether fair and unprejudiced manner. If the industry will fulfill its obligations under the Act in the same spirit, immeasurable benefits from the enactment of the Natural Gas Act will follow for the public and industry alike."

INDUSTRIAL GAS SECTION

The meeting was opened on Tuesday afternoon with Hale A. Clark, Chairman, presiding. Mr. Clark presented his address on the activities of the section and the progress in industrial and commercial gas during the year of his stewardship.

At this time a paper prepared by Charles C. Krausse of Consolidated Electric Light & Power Company of Baltimore was presented by Lawrence E. Biemiller due to Mr. Krausse's unavoidable absence. Time did not permit of any discussion of this paper, entitled, "Holding the Pressing Machine on Gas," but the methods used in increasing the efficiency of the boiler and the steam requirements of pressing machines were ably covered and show that both of these items are contributing factors to the lack of acceptance by the tailor. In the presentation of this, Mr. Krausse stated that 50 revampments had been completed and that 49 had proved entirely successful in maintaining this steam load.

"We recommend," he said, "that the gas industry recognize the strength of this competition for the pressing machine load. We may as well admit that there is a wide spread in actual fuel costs with usual prices for kerosene and for gas under commercial schedules. But the gas industry can retain this load if it offers truly superior service with its fuel, which results in gas being used with the maximum thermal efficiency and the tailors making minimum expenditures for maintenance to secure continuous and dependable operation. We believe that the average neighborhood tailor can be caused to evaluate such factors, so that he will stick to gas fuel.

"We recommend that individual companies give consideration to the adoption of the following principles which have been discussed in this paper:

(1) To make it easy for the tailor to return to gas with a minimum capital outlay.
(2) To remove the oil equipment from the secondhand market by making an allowance therefor, to prevent its reappearance when once removed.
(3) To offer tangible improvements to equipment that will improve operations as well as offer reduction of gas consumption, such as the new injector, boiler baffling, etc.
(4) To offer a complete service including the equipment that requires it most, i.e., the machine. The tailor does not consider his boiler separate from the machine as the gas companies have been prone to do, but considers the two as one unit.
(5) To apply an equally liberal policy to oil users whom it is desired to change back to gas, and to existing gas users who may be approached by the oil burner salesman at any time."

The next paper on the "Relative Importance of Dehumidification and Cooling in Air Conditioning," was presented by Charles L. Leopold, Consulting Engineer of Philadelphia, who took two rather important installations, one using compression refrigeration, the other using Silica-Gel dehumidification, both of which were located in western department stores, conditions obtaining being similar. The results did not show any important factors favorable to either installation, and figures as to relative wet and dry bulb temperatures were not conclusive.

The last paper of the afternoon on "Bringing Insulation Facts Up-to-Date," presented by G. E. Grimshaw, Johns-Manville Corp., New York, brought for the variety and types of present day insulating materials in the low, medium and high temperature field. He evaluated the relative merits of fire clay brick backed up by insulating brick and insulating fire brick. Also he described and discussed each of eleven different types of insulating materials for industrial ovens operated at 700 degrees F. or lower. Engineering and economic data on how to select and apply insulation for various types of installations was featured.

The Wednesday afternoon session opened first with a symposium—"How Far Have We Gone in Modernizing Commercial Kitchens?" conducted by George L. Cullen, Harrisburg Gas Co., Harrisburg, Pa. He drove home the necessity for cooperating with kitchen equipment houses; classed newspaper advertising which plugs gas-conscious chefs and local spots as an important means of promotion; and recommended drives to remove old equipment.

Hugh L. Wathen, Atlantic City Gas Co., covering hotel kitchen, told how oil had been routed from 21 out of 24 Atlantic City hotels; and boasted that 70% of all that city's hotels had strictly modern gas cooking equipment. A 26% savings in fuel cost alone was achieved in the Hotel Traymore through modern gas kitchen installations.

Comparing the 37 pieces of modern gas equipment purchased for the

Italian Government Building of the New York World's Fair 1939 with the inefficient coal, charcoal, and wood-fired apparatus one would have found at the Chicago Columbian Exposition in 1893, Harold Hone, Consolidated Edison Company of New York, painted the restaurant side of the progress picture. He further noted that "Of the more than 10,000 restaurants in Manhattan and the Bronx, not more than 100 use any other fuel for food preparation than gas."

The second symposium covered "Sales Features of Today's Gas Commercial Cooking Equipment," and was led by Harry A. Sutton of Public Service Electric & Gas Co., Newark, N. J.

Charles F. Henness, Public Service Co. of Northern Illinois, pointed out that "fundamentally, the commercial range customer is interested in (1) food quality, (2) overall economy, and (3) appearance. It is usually in that order." He listed in tabular form the sales features of the modern commercial gas range under the headings: The Benefit, The Reasons and Mechanical Features.

Harry M. Woolman. Jersey Central Power & Light Co., observed that 3,000 heavy duty ceramic gas broilers were already in service, indicating the potency of the ceramic or infra-red-ray element as a sales feature. "Today's improved broiler uses about 130 cubic feet of manufactured gas per hour as compared with 300 cubic feet for the old style broiler."

The modern deep fat fryer is also a reborn beauty. "The immersion tube fryer does away once and for all with the charring and burning of food particles," according to James F. Pitman of J. C. Pitman & Sons, Lynn, Mass. Mr. Pitman also emphasized that in frying the cost of fat frequently exceeds by a wide margin the total costs of initial appliance purchase, upkeep, and fuel. Modern gas fryers materially cut down on fat costs.

The paper prepared by A. O. Leech, Portland (Oregon) Gas & Coke Co., on "The Sales Features of Miscellaneous Gas Commercial Cooking Equipment" was read by George Segeler of A.G.A Headquarters. It included a detailed analysis of a form for making estimates for commercial cooking installations. An unusual feature was the listing of intangible benefits that may be expected to accrue from the use of gas—with a specific dollar value given for each.

The first symposium on Thursday carried the title "Have We Been Overlooking Opportunities in Small Industrial Uses for Gas?" Led by Lawrence R. Foote, Central Illinois Electric & Gas Co., the three speakers, R. N. Gorsuch, Citizens Gas & Coke Utility of Indianapolis, C. T. Bennett, Consumer's Gas Co. of Toronto, and W. Wirt Young, Watertown, Conn., all used numerous slides to illustrate smaller, but load-building industrial uses of gas. Mr. Gorsuch showed slides of special applications in his territory. A set-up helpful in winning back lost smoke-house business was included. Mr. Bennett restricted himself chiefly to bench equipment—bunsen, soldering, blast, small forge, and special burners. Toronto has built fine loads by following up bunsen burner sales. Mr. Young's thesis was that the small installations are not only worth getting, but may be the key to large increase in industrial gas loads. He pointed out the need for (1) more men, (2) younger men, (3) complete market surveys, and (4) definite merchandising programs.

The second symposium of the afternoon covered "Successful Methods for Promoting the Sale of Standardized Industrial Gas Equipment," and was led by John H. Warden of the Oklahoma Natural Gas Corp., Tulsa. The discussion of heat treating furnaces by Elmer C. Cook, of American Gas Furnace Company covered the sales methods used in heating and insulating a standardized heat treating furnace and showed all the procedure taken in connection therewith.

Carlton W. Roll of The Brooklyn Union Gas Company discussed the sale of standard reel bake ovens and brought out very forcibly the fact that the market for this type of baking equipment is returning.

Everett Magnuson of Eclipse Fuel Engineering Company, next discussed sales possibilities with gas-fired steam boilers and showed the trends in sizes that are being installed by gas companies throughout the country.

Finally, R. Louis Towne of Surface Combustion Corp., effectively presented the use of sales helps and planned sales programs for promoting standardized industrial gas equipment sales.

COMMERCIAL SECTION

Sound Sales Logic Rides on the Wings of Drama in Two Enthusiastic Sessions

Address of the Chairman

Hugh H. Cuthrell

The Brooklyn Union Gas Co., Brooklyn, N. Y.

Mr. Cuthrell in his summary of the activities of the Commercial Section during the past year stated that the most important of these was in connection with the promotion of the CP Range development and campaign. He outlined the origin of this development which started with a committee appointment in 1937 and he urged all gas companies to get sincerely behind the CP Range Program.

In speaking of gas house heating, he felt that a rate of not over 50c per M is necessary to hold the house heating load.

In referring to the Home Appliance Planning Bureau, he made mention of the two divisions of this activity. Part I covered the architectural competition, which is now completed and in which 5,400 architects were entered.

Part II of this Bureau covers the builders' competition in which 1,100 or more all-gas houses are being constructed in this contest in which builders from practically every state in the Union have entered.

The new Salesmen's Training Course which is being revived and rejuvenated will be ready for distribution early in November. Four thousand four hundred salesmen were enlisted in the former course.

In closing, he paid tribute to the activities of the Committee chairman during the past year and called attention to the fact that the domestic sales of manufactured and natural gas show an upward trend.

The Certified Performance Range Activity to Date

F. M. Houston, Chairman

Domestic Range Committee, Rochester Gas & Electric Corp., Rochester

Mr. Houston continues as chairman of this same committee for the coming year. In his address he outlined the history of the launching of CP Range activity and the requirements and stated that the regional organizations through their managers have done excellent work in the campaign since it was gotten under way.

In making a comparison of the CP and electric range, he stated that while the electric range can meet most of the CP *requirements* the real answer lies in the *convenience, simplicity* and *performance* of the CP Range.

The gas range is superior to anything available for low temperature cooking, the temperature variation being about 5° for oven cooking, whereas the electric oven varies from 30 to 60°.

Moreover, he stated that, depending on local conditions and rates, the operating cost of an electric range will be from 50% to 100% more than the gas range.

FRANK M. HOUSTON

R. S. AGEE

The Future of the Certified Performance Range

R. S. Agee, Promotion Manager

Association of Gas Appliance & Equipment Manufacturers

IN a convincing and spirited address, Mr. Agee predicted a great future for the CP Range. The point that arose in his mind is, "why is there a need for a range of this type." And the answer is that range sales have *not* been getting along all right, as the downward trend of the domestic load has indicated this.

During the falling off of the cooking load, gas refrigeration and gas water heating have shown gains in the same period.

"Everyone knows that well over a million gas refrigerators have been sold during the last nine years. In the same period we have sold over 5,500,000 automatic gas water heaters.

"The cooking load is the very keystone of our rate arch. It is the foundation of our business as shown by the fact that of our 17 million gas meters, 16 million are domestic meters, exclusive of house heating or 92% of the total. During the last 9 year period, we have sold only 6½ million gas ranges with heat control.

"Now, we have under one national trademark that united industry with a united story backed by a universally produced product—a product that is a thing of beauty—a product that is efficient to the nth degree—a product which equals competitive equipment on nearly every front and surpasses competitive equipment due to the advantages of the speed, flexibility, controllability, dependability and economy of our fuel."

While gas ranges are now operated in sixteen million homes throughout the country, only about six and a half million of these are of modern type, leaving nearly nine million oldtimer gas ranges still in use or disuse. This represents 60% of the customers' homes.

No fuel is better than the equipment through which it is used, and there are altogether too many ranges now in use which can be characterized as horse and buggy equipment.

During the years 1928 to 1937, thirty-five million small electric domestic appliances have been sold on account of their convenience as compared with the old type ranges and have resulted in a decreased use of gas in such types.

He felt that the CP Range is the answer to this condition. That is the "biggest news in cooking equipment in many years, the most exciting sales story ever offered."

There are two types of gas men who retard the progress of the CP Program: (1) The Zoo-Keepers and (2) the 70 Percenters.

The attitude of the first group is that the CP Range is too efficient and the result of such a modern range will be to decrease the gas load. The second group—the 70 Percenters—are those who feel that 70% of their customers can not afford a CP Range because that proportion is in the $1500 income class. Yet these same individuals buy automobiles, radios and other products which may be considered in the luxury group.

He made the point that in the matter of saving fuel, the CP Range pays for itself and in the long run "costs less to own" than the old type of range. He bore down on the fact that *price* and *cost* are not the same thing, and pointed out that the "CP Gas Range News" lists eighteen ways to save gas.

There are nine million obsolete gas ranges still in use, and it is among these homes that the modern CP Range must be sold. This can be accomplished through intensified salesmanship, the use of the many sales outlets available and a forceful local advertising campaign.

His address was given added punch through the display of 19 charts graphically illustrating the fundamentals of the CP Range campaign and the sales possibilities that lie ahead.

We're Not Ugly—It's Just the Way We Dress

Ray T. Ratliff

Kansas City Gas Co., Kansas City, Mo.

In his address, Mr. Ratliff outlined the many phases of local advertising which gas companies can make use of in their campaigns for more business. He pleaded for more complete participation in national advertising as well.

"The customer is more interested in what gas will do than in the details of the equipment which furnishes the service. Local advertising should keep the customer sold on the use of gas and should tell of the marvelous performance of the modern gas range. These points characterize the national advertising copy which is running in the popular publications."

He felt that the point of attack of electric range advertising has particularly featured the "modernity" of the electric range, and pointed out that the copy on gas ranges prepared by A.G.A. is material that all gas companies can use as a basis for their own local campaigns. The only way we can successfully compete with our competitors through advertising is to use the same media that they are using to tell our story of the modern gas range.

What 130 Million People Want to Know

E. C. Sorby

Geo. D. Roper Corporation, Rockford, Ill.

Mr. Sorby, in a stirring talk, voiced dramatically the story of the CP Range. He paid a tribute to the presentations of the previous speakers and endorsed their appeal for active promotion of CP Range sales. He summarized the outstanding characteristics of gas cooking in the following eight points. Preference as fuel, speed, cleanliness, coolness, economy, flexibility, dependability and simplified cooking.

The stage was set with a gas range wrapped in cellophane and in the oven of this range a fourteen pound roast had been cooking for nine or ten hours. A huge knife, fork and spoon displayed on the stage, represented the working tools of the nation. A large frame displayed many copies of national ads that have been run to promote gas. Stepping through this frame he referred to the working tools of the nation and associated the importance of these tools with food, presenting the food story through a lot of national ads that talk and sell food.

Concluding the talk, he tore the cellophane bag off the range and produced the fourteen pound roast that had been cooking for this long period of time as evidence of what we mean by carefree cookery.

Second Session

The second session of the Commercial Section opened with a skit "Making A Water Heater Sale." This was presented by G. F. B. Owens, Manager, New Business Department, The Brooklyn Union Gas Company, the cast being all members of that organization.

The skit, which provoked many a laugh, illustrated many points on how and how not to make an automatic gas water heater sale. It brought to the fore many of the telling points which can be used to advantage.

Following a brief address by the retiring president of the A.G.A., Mr. McGowan, and an address by Major Forward, the functions of Home Service in creating sales were competently presented in the address of Mildred Clark, chairman of the Home Service Committee. She stated that one of the objects of home service is to teach every employee of a gas company how to sell gas service and appliances. In making reference to the activities of this department, she stated that 500 gas companies now have 1200 women engaged in home service activities.

Susceptibility Quotient

H. D. Valentine

The Peoples Gas Light & Coke Co., Chicago

In a dramatic and humorous address, Mr. Valentine explained the origin of the title of his address which had its birth in the "intelligence quotient," which is keyed with the "personality quotient" and leads up to "The Susceptibility Quotient—End Product of Sales Promotion."

In verbal pictures, he burlesqued the contracts between obsolete sales methods, pointing out how salesmen were trained for their work in the earlier days of sales effort, and made interesting comparisons with present methods. Furthermore, he stated that present methods are successful because salesmen are now fortified with complete data on the product they have to sell and its performance.

In referring to gas house heating, their company had sent out a questionnaire to 7,643 gas heating customers to find out if they were satisfied with their present equipment and its performance.

A reply in the affirmative was received from 98% of them.

"Consumer acceptance on equipment is developed by gathering facts and figures on the experiences of satified users. This type of consumer acceptance is not helped nor the susceptible quotient assisted by the use of high pressure selling methods."

Refrigeration and the Future

H. Carl Wolf

Atlanta Gas Light Company, Atlanta, Ga.

In discussing his subject, Mr. Wolf made reference to the worth of gas refrigeration as a load builder in that it builds up acceptance of gas for other uses.

He felt that we had reached the tail end of the era where cuts in price and profits were essential to sales success.

We are now entering an era of new sales methods.

Gas refrigeration still serves but a small proportion of the possible customers and there is a tremendous field still open for increased sales.

He further made reference to the great opportunities for sale of equipment for air conditioning.

In the matter of gas refrigeration, he offered the following slogan:—"Gas the refrigerating method of today, tomorrow and always."

The report of the Nominating Committee was presented by F. M. Banks, Chairman, and the following nominated for the ensuing year:—Chairman, F. X. Mettenet, Peoples Gas Light & Coke Company, Chicago; Vice-Chairman, Davis M. DeBard, Stowe & Webster Corporation.

LAVA

Burners and Tips
at point of combustion

Non-Carbonizing - Non-Corrosive

This material is easily adaptable to the shapes required and is economical.
When your burner design permits, large production quantities can be pressed in AlSiMag at worthwhile savings.
Send sketch or sample of design. Estimate can be promptly supplied.
AlSiMag—die pressed or extruded—for other high temperature applications and for electrical insulation.

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AMERICAN *Lava Corporation*
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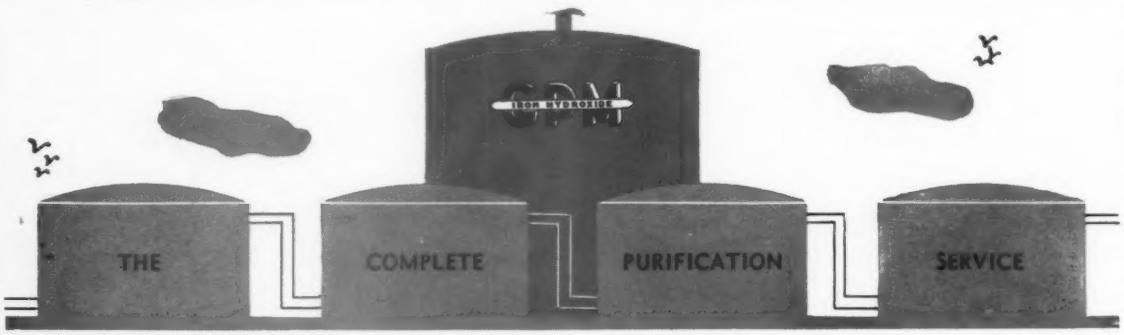

OUR PURIFICATION ENGINEERS have built into GPM Iron Hydroxide a dozen and a half years of specialized ingenuity and perseverance. We have perfected a material which is not only impressive in the laboratory but has met the iron test of diversified plant practice through the years. We have erected a standard for purification which makes costly experimental innovations unnecessary.

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GAS PURIFYING MATERIALS CO. INC., NEW YORK CITY AND PROVIDENCE

TECHNICAL SECTION

Report of Chemical Committee*

Prof. J. J. Morgan, Chairman

Columbia University, New York, N. Y.

New Developments, by G. E. Ludwig, *Chairman,* Grand Rapids Gas Light Co., Grand Rapids, Mich.; **Practical Results in Primary Phosphate Treatment of Boiler Feed Water,** by T. L. Robey and V. M. Perry, Washington Gas Light Co., Washington, D. C.; **Chemical Aspects of Carboseal,** by Dr. J. R. Skeen, The United Gas Improvement Co., Philadelphia, Pa.; **Methods for the Determination of the Specific Gravity of Gas,** by C. W. Wilson, Consolidated Gas Electric Light & Power Co. of Baltimore, Baltimore, Md.; **Flames and Flame Velocities — Applied Aspects,** by A. R. T. Denues, Pittsburgh Testing Laboratory, Pittsburgh, Pa., **Microchemistry in the Gas Industry —Part I,** by R. J. Sheridan, The Brooklyn Union Gas Co., Brooklyn, N. Y.; **New Developments In Gas Meter Work,** by L. M. Van der Pyl, Pittsburgh Equitable Meter Co., Pittsburgh, Pa.; **Analyses and Tests,** by W. E. Russell, *Chairman,* Consolidated Gas Electric Light & Power Co. of Baltimore, Baltimore, Md.; **Determination of Organic Sulfur in Gases, Progress Report No. 1,** by W. E. Russell, Consolidated Gas, Electric Light & Power Co. of Baltimore, Baltimore, Md.; **Determination of Nitrogen Oxides in Gas,** by Prof. Wilbert J. Huff, *Chairman,* University of Maryland, College Park, Md.; and **Supervising the Publication of "Fuel-Flue Gases,"** by Louis Schnidman, *Chairman,* Rochester Gas and Electric Corp., Rochester, N. Y.

** This report, presented at the Technical Section Meeting of the A.G.A. Convention on October 11th contains the following subcommittee reports:*

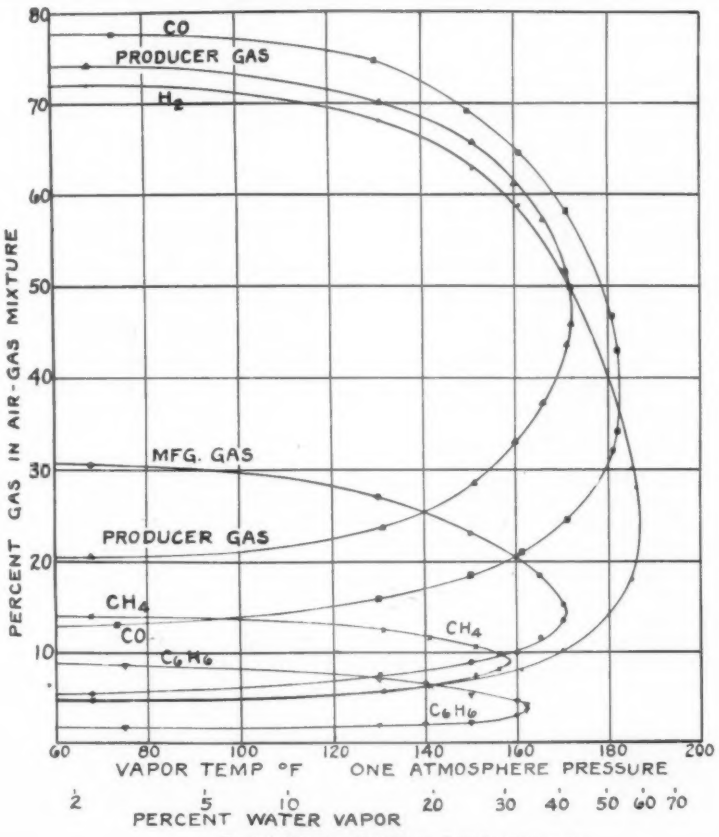
The Extinction of Gas Flames by Steam

Data Underlying the Practice of Steam Purging

by

Jesse S. Yeaw and Louis Schnidman

Rochester Gas & Electric Corporation
Rochester, N. Y.



The extinction of combustible gas flames by water vapor

The extinction of the flames of hydrogen, carbon monoxide, methane, benzene vapor, coal gas, and producer gas, by increasing proportions of steam, has been experimentally studied using a spherical 350 c.c. glass explosion pipette and a spark discharge as a source of ignition. Corresponding experimental data showing the extinctive effect of nitrogen and carbon dioxide have been obtained by others. This work has been summarized and compared in this paper.

Steam was found to be equivalent to and in some instances superior to the inert carbon dioxide in its quenching effect on flame propagation. Nitrogen is much weaker in this respect than either of the others.

The paper includes tables and charts presented and plotted in such ways as to given the general information necessary for the proper treatment of any mixture to prevent explosion hazards. A section is also devoted to the calculation of the explosive limits of any mixture for which the analysis is available.

Abstract of Paper Presented before Technical Section at A.G.A. Convention, Atlantic City, N. J., Oct. 12, 1938.

Colloidal Properties of Iron Oxide in the Removal of Hydrogen Sulphide From Gas

by

Frank H. Dotterweich[1] with Wilbert J. Huff[2]

From the data obtained it appears that, to be satisfactory, an iron oxide purifying material must be in the colloidal form. The fine subdivision represented by colloidal particles gives the large surface necessary for satisfactory activity with hydrogen sulfide.

The oxides may be separated into two groups which show different properties for capacity and activity. These groups were designated as: Group 1 — oxides containing more than 11 per cent by weight of aluminum oxide, and Group 2—oxides containing less than 11 per cent by weight of aluminum oxide.

Group 2 oxides, low in percentage of aluminum oxide, gave increasing activity with decreasing particles size; however, their activity was affected by changes in alkalinity, i.e., as the alkalinity was increased, the activity increased.

In the capacity tests as conducted herein with these oxides (Group 2), as the particle size decreased the capacity decreased. Since the reaction of iron oxide and hydrogen sulfide is exothermic, for a given amount of oxide the speed of heat liberation may be dependent upon the reaction speed or the activity; the greater the activity the higher the temperature to which the oxide will be subjected under fixed conditions. The temperature to which these amorphous particles of ferric oxide were subjected may possibly have caused these to become crystalline, as stated by Steinkopff.

Oxides of Group 1, containing higher percentages of aluminum oxide, also gave increasing activity with decreasing particle size. It was noted, however, that after a certain percentage of aluminum oxide was reached, reduction in alkalinity by washing did not affect the activity of these oxides. Bunte and others have reported similar observations. Steinkopff, referring to the conversion of amorphous ferric oxide and other metallic oxides to the crystalline form by heat, does not include aluminum oxide in the group. The colloidal ferric oxide in these samples may have been prevented from changing from the amorphous to the crystalline form by the mechanical spacing of the colloidal aluminum oxide. The washing in this case might not affect the activity because the large surface offered by the ferric oxide was made possible by the insoluble aluminum oxide.

It was noted in the capacity tests that although oxides in Group 1 were subjected to approximately the same temperature as the oxides in Group 2, the capacity increased with decreasing particle size. This phenomenon may again be attributed to the mechanical spacing of the colloidal ferric oxide by colloidal aluminum oxide. Although not complete, the observations suggest that increasing percentages of colloidal aluminum oxide in colloidal ferric oxide increases the activity and capacity.

When commercially prepared oxides were heated to 550°C. for a period of one hour there was a marked change in color. This was accompanied by an increase in particle size as determined by dye adsorption and a corresponding decrease in activity and capacity. In the capacity tests with these samples it was noted that the capacity increased on successive foulings. This may possibly be explained in that the heating to 550° C. caused the particles to go from the amorphous to the crystalline state even when spaced by aluminum oxide. These crystals were apparently unstable and successive foulings may have tended to disperse these once again to the amorphous form.

When an oxide apparently formed by processes of nature was heated to 550° C. for one hour it changed color from yellow to a bright red with a corresponding increase in particle size and a decrease in activity. The capacity of this oxide was practically the same as that obtained with the sample dried at 110°C. The decrease in dye adsorption and decrease in activity indicate the formation of larger particles in the conversion of the amorphous ferric oxide to the crystalline state by heating. The high original fouling suggests that the heat of reaction caused these crystals, apparently unstable, to break down, giving a large surface resulting in the high adsorption of hydrogen sulfide. On successive foulings, with the natural oxide dried at 110°C. and 550° C., there was a great decrease in successive foulings until on the fourth fouling the capacity was but about 40 per cent of the original value. This may be explained on the assumption that the natural oxides have the ferric oxide in such an amorphous form that on fouling this amorphous form gradually increases into the larger crystal forms of the oxide, resulting in decreased hydrogen sulfide removal. These natural oxides were all reported as indifferent in industry. The addition of sodium carbonate to these oxides, although increasing activity, did not overcome the undesirable low capacity characteristics noted with the original samples.

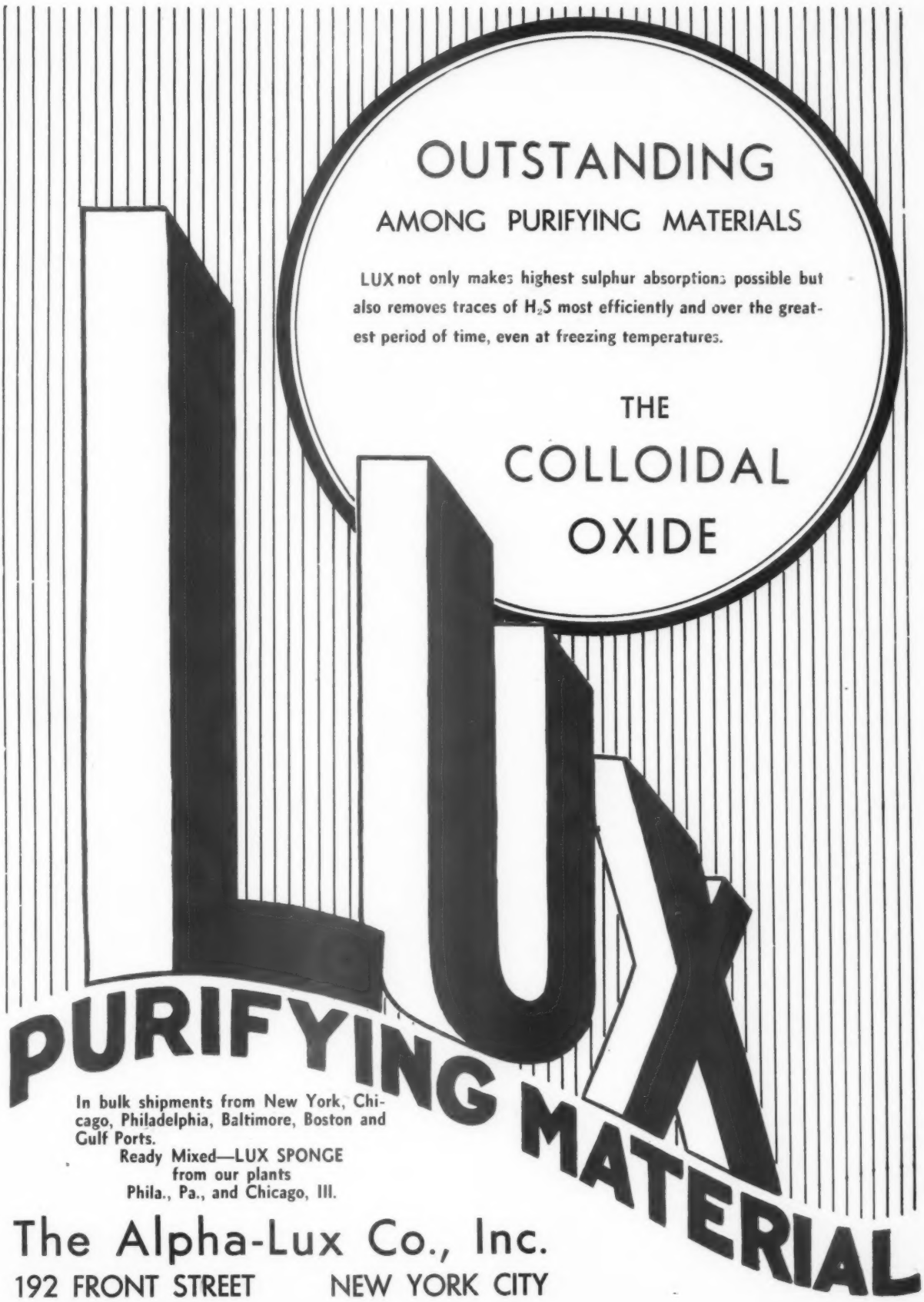
From these studies, it appears that oxides high in colloidal ferric oxide and low in inert content give high activity, but when fouled with gas of high hydrogen sulfide concentration, the amorphous ferric oxide tends to go to the crystalline state. Mixing this type of oxide with greater proportions of shavings, although increasing the capacity, does not completely eliminate this undesirable feature due to the impossibility of uniformly dispersing solid colloidal over non-colloidal solid substances by simple mixing. This type of oxide, when mixed with equal proportions by weight of powdered Albany clay, high in aluminum content, gave a large increase in capacity. Although the study was not conclusive, it appears that a desirable oxide may be obtained when colloidal iron oxide and aluminum oxide are in the proportions by weight of 2 to 1.

The test as developed for the determination of particle size or surface of iron oxide purifying material appears to give a satisfactory method of rating such material. It should only be used where the calcium content of the material is low. Materials with high concentrations of calcium should be washed before testing. This will tend to eliminate inconsistent dye adsorption due to the calcium.

[1] *Associate Professor, Natural Gas Engineering, Texas College of Arts and Industries, Kingsville, Texas.*

[2] *Professor of Chemical Engineering, University of Maryland, and Consulting Chemist, United States Bureau of Mines.*

Abstract of Paper Presented before Technical Section at A.G.A. Convention, Atlantic City, N. J., Oct. 12, 1938.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Control of Deposits in Manufactured Gas Distribution Systems

by

A. R. Belyea, Chemical Engineer

and

R. L. McAll, Assistant Engineer

Consolidated Edison Company of New York, Inc.,
New York, N. Y.

The authors have found that in their experience the control of deposits in manufactured gas distribution systems resolves itself into the control of condensibles in gas by gas conditioning. The condensibles in gas are of two classes: water and hydrocarbons. Water deposition in gas distribution systems may be evidenced by excessive drips pumping, stoppages by liquid water, frost complaints during the winter months, or corrosion of steel and iron mains with subsequent rust complaints. Hydrocarbons condensing in the distribution system may be evidenced by loss in gas heating value, napthalene deposits, or by oily condensate which, upon oxidation, polymerization and vaporization of the lighter fractions, may deposit as gum. Condensible hydrocarbons content of gas may also be evidenced through removal or replacement of dressing oil in leather diaphragms of meters and governors and through removal of the natural oils in the fibres of jute packing in bell and spigot joints.

Water Condensation and Its Effects

Corrosion of the distribution piping is believed to occur when the surfaces are wetted with condensate from the gas. When rust films thus formed are dried out, they loosen from the metal surface and expose fresh metal for corrosion when moisture is again present. Thus an alternate wet and dry surface condition exists which is conducive to a more rapid rate of corrosion than if the surface were continually wet.

Means available for conditioning gas to a dew point approximating ground temperature include atmospheric cooling, water cooling, refrigeration, compression and cooling, and use of chemical dehydrating agents.

In addition to the conditioning methods previously described, rust complaints alone may be temporarily checked by the use of oil fog to hold rust particles to the main surfaces during the dry period. Deposited oil may also serve as a protective coating to prevent further corrosion. The oil used is normally a high boiling petroleum distillate, and is introduced into the gas stream by vaporization or atomization methods. In travelling through the mains the fog gradually deposits on the interior of the system, and under favorable conditions may carry into the consumer's meter.

Effects of Hydrocarbon Condensation

Gas as normally distributed from a plant storage holder to a typical low pressure system contains hydrocarbon vapors which are subject to condensation in a manner similar to water vapor. In the case of these hydrocarbon vapors, however, we are dealing with a mixture of compounds of differing vapor pressure rather than a single compound.

Gas conditioning by any means previously described, other than the use of chemical dehydrating agents, will remove oil vapor as well as water vapor. However, elimination of oil condensation on the system may not be sufficient to eliminate gum troubles, and a specific conditioning operation may be necessary.

Several conditioning methods are advocated by their proponents for the control of gum. Among these are selective oil scrubbing for removal of liquid phase gum formers, fogging with an oil containing a gum inhibitor, and for control of nitrogenous gum subjecting the gas to an electric brush discharge or controlled oxide purifier box operation.

Condensation in High Pressure Distribution

The previous discussion has related only to conditions on a low pressure system. On a high pressure system condensation conditions are in general similar, although compression produces three additional effects of importance in considering gas conditioning. The first effect arises where gas drawn from a holder is compressed for transmission purposes. Much of the heat resulting from compression is retained by the gas. Unless that heat is removed from the gas at the compressor station, it must be dissipated by the mains system before condensation can start. This results in an area near the compressor in which no condensation will take place, followed by an area at a greater distance where condensing conditions exist. Under these circumstances there will be two areas subject to alternate "wet" and "dry" conditions, one close to the compressor where condensation starts, and the other at the outer edge of the condensing area. Where the heat of compression is removed before transmission the gas temperature and condensate conditions are similar to those existing where gas is distributed at holder pressure.

The second effect of compression is to accentuate the possibility of gum trouble on the system as a result of the increased temperature and pressure and higher proportion of condensible oil vapor to water vapor.

The third effect of gas compression in high pressure distribution occurs when the gas is expanded for distribution in a low pressure system. Expansion of the gas results in under-saturation and tends to vaporize oils and water present in the distribution system. This under-saturated condition of the gas has its greatest effect on systems formerly experiencing oil and water condensation, the loss of condensate causing leaks at main joints and drying out of leather diaphragms of consumers' meters.

There are several remedies for such a condition. One is a resaturation of the gas with water vapor, but such a method, unless carefully controlled, necessitates pumping of drips and may cause corrosion and rust troubles. A second remedy is the use of selected liquids as leak deterrents which may be applied by pouring, spraying or fogging methods. The object of the treatment is to bring the liquids into contact with the yarn of the joints, where it is claimed to swell the packing and render the joints gas tight.

A third remedy is oil fogging, which will resaturate the yarn and prevent leaks at joints, restrict the movement of old rust and dust deposits in the mains, and may also replace the oil in the dried leather of the meter diaphragms.

Abstract of Paper Presented before Technical Section at A.G.A. Convention, Atlantic City, N. J., Oct. 11, 1938.

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A Primer on Deposits in Gas Pipes and Appliances

by
Alfred R. Powell
Koppers Company, Pittsburgh, Pa.

If gas left the point of manufacture or production entirely free of suspended liquid or solid material and remained free of suspended or condensed material up to the point of consumption and contained no constituents that would chemically attack the metal of appliances, then there would be no problem of stoppages in gas supply. In other words, absolutely 100% gas, free of corrosive substances, could not possibly cause stoppage of flow, even after years of continuous service of the gas mains and customers' appliances.

Unfortunately, this idealistic condition does not exist, and distributed gas always contains some of the above trouble-making factors. The best that can be hoped for in practice is that these substances shall be so small in amount or occur in larger amounts at such infrequent intervals that the problems of removing deposits from pipes and customer appliances will be but a very minor part of the regular maintenance and servicing.

1. Classification of Causes of Stoppages

The conditions that lead to deposits of material in gas pipes and appliances may be divided into five classes. It is quite essential that the differences between these methods of formation be clearly distinguished, because the material resulting from each condition is related to the material in another class only in one respect, namely, that each forms deposits that may result in stoppage; in every other respect they differ and, obviously, different corrective means must be used.

Class 1. Suspended matter in gas leaving plant. This is probably the most simple and obvious cause for trouble from deposits. The gas leaving the plant is not 100% gas but carries in suspension liquid or solid particles. Usually the suspended material is tar.

Class 2. Material deposited by condensation after leaving plant. In this case the gas leaving the plant would be 100% gas, if the trouble outlined in Class 1 were not also present. If one could examine this gas as it left the plant by means of a magnifying instrument he would say that no material was present that could form a deposit unless some change occurred later. However, the gas contains vapors of substances that are quite close to the condensation point, and as the temperature of the gas decreases after leaving the point of production these vapors condense in the distribution system and thereby form deposits of liquid or solids. The chief substances falling in this classification are (1) water or ice, (2) drip oil, which often contains indene and styrene that will later solidify into gum (so-called liquid-phase gum), (3) naphthalene, which condenses from the gas as a solid, and (4) natural gas hydrates.

Class 3. Material deposited by chemical reaction in gas after leaving plant. This case involves the same appearance of the gas leaving the point of production as just described for Class 2; that is, the gas is free of suspended matter and apparently should not produce deposits of liquids or solids unless some change occurred. The change that does occur after the gas leaves the plant is not the physical condensation due to lower temperature, such as was described under Class 2, but is a chemical reaction between several of the constituents of the gas resulting in the formation of new chemical compounds that are liquids or solids and which will deposit out of the gas and may produce stoppages. Nitrogenous or so-called "vapor-phase" gum is the best known example of this method of deposit formation.

Class 4. Material deposited by mechanical pickup of material from another part of distribution system. This class of deposit formation is unique in that the gas may be absolutely clean leaving the point of production and may not have any constituents that would later form deposits. Where dust or dry powdered material of any kind is present in a gas main the velocity of gas flow may be sufficient to carry it forward to be deposited again where the gas velocity drops or where there is a sharp change in the direction of flow. The term "dust" applied to this type of deposit material may cover a wide variety of substances, some of which were initially produced by other methods of deposit formation, as, for example, corrosion products resulting from the action of certain gas constituents on the metal of the mains.

Class 5. Material deposited by chemical reaction between gas constituents and metal. This type of deposit may be formed from gas that is absolutely free of suspended matter or condensable material right up to the point of utilization. However, it is known that certain constituents of gas will react chemically with metal and the corrosion deposits so formed may cause stoppage directly at the location where corrosion occurs. Cyanogen-sulphur deposits are typical of this class.

2. Description of Different Classes of Stoppages

Class 1. Suspended matter in gas leaving plant. Among the most common materials that may be present in manufactured gas in the form of suspended mist or fog as the gas leaves the plant are tar and lampblack.

Many types of equipment are available for the removal of tar fog and lampblack from gas and many types are in use at the present time. The three most commonly used principles are those of impingement, electrical precipitation, and adsorption.

Class 2. Material deposited by condensation after leaving plant. As mentioned previously, the materials falling in this class are in the form of vapor as the gas leaves the plant and later condense from the gas as liquids or solids when the gas is cooled to a lower temperature in the distribution system; the most common materials in this class are water or ice, drip oil (which may contain gum-forming substances), napthalene and hydrates. An obvious method for removing all of these condensable materials before the gas leaves the plant would be to cool the gas to a temperature lower than any point of the distribution system and then draw off the condensed liquids and solids; this has actually been done in some cases, but usually less expensive means than refrigeration are available and will be mentioned later.

1. Water and ice. Although water constitutes by far the largest deposit occurring in gas-distribution systems, it is usually not regarded as a deposit.

Abstract of Paper Presented at Technical Section at A.G.A. Convention, Atlantic City, N. J., Oct. 11, 1938.

However, the condensation of water in the mains and services and meters does often lead to deposits that will cause stoppage of gas flow in mains or customer appliances.

The methods available for the removal of moisture from gas fall into four classes, 1—compression, 2—refrigeration, 3—treatment with hygroscopic substances, and 4—treatment with adsorbents. Compression of gas is often practiced today primarily for other reasons than dehydration, the partial dehydration of the gas being secured incidentally. The most commonly used system today is treatment with hygroscopic substances, such as calcium chloride, diethylene glycol, etc. In order to avoid any trouble from dust, drying out of joint and valve packings, etc., in connection with the removal of moisture from gas, oil is usually injected into the mains in the form of a mist or fog. This creates an oil-moist condition in the system in place of the water-moist condition existing previous to dehydration. Since it is most desirable that only part of the moisture be removed from gas, there are certain situations involving extremely dry gas where addition of water, or rehydration, is beneficial.

2. Drip oil and indene-styrene gum (liquid-phase gum). Drip oil is the general name applied to the oily condensate from gas coming out in the distribution system. Unfortunately, however, this drip oil, particularly in carburetted water gas systems, usually contains rather a high percentage of unsaturated hydrocarbons, such as indene and styrene, and these substances, originally deposited as a liquid, will gradually undergo a chemical change that converts them into a gummy, semi-solid or solid material that is one of the worst offenders from the standpoint of stoppages. Oxygen in the gas promotes this conversion of deposited drip oil into gum.

In addition to preventing the formation of excessive quantities of indene and styrene in water-gas sets, other methods of control of the formation of this type of gum are available, including close control of the oxygen content of the gas, scrubbing the gas with oil, and refrigeration or compression.

3. Naphthalene. Although naphthalene is a solid material, its vapor pressure is high enough to permit the carrying of considerable quantities as a vapor in the gas.

Naphthalene is almost universally a constituent of manufactured gases of all types and there is not much that can be done in a practical way to prevent its formation.

In plants having especially good condensing and cooling facilities naphthalene may be reduced to a quantity that will give little trouble from deposits in the distribution system. Usually, however, this is not the case, and scrubbing of the gas with oil must be resorted to.

4. Natural-gas hydrates. This type of deposit has been encountered only in rather recent years, and is confined entirely to natural gas distributed at high pressure. The conditions that are conducive to the formation of these hydrates are high pressures, low temperatures, and the presence of a sufficient amount of water vapor in the gas. The freezing points of these hydrates are higher than for water and in general become higher as the pressure increases. Many methods of control have been used but recently the most widely used control method has been dehydration of the high-pressure gas.

Class 3. Material deposited by chemical reaction in gas after leaving plant. In the manufactured-gas industry the only case of gaseous constituents that react with each other chemically to form deposits after the gas has left the plant is that of the formation of nitrogenous or vapor-phase gum.

The chemical interaction of three gaseous constituents, namely, nitric oxide, oxygen, and certain unsaturated hydrocarbons, leads to the formation of this material.

The appearance of the vapor-phase gum is quite similar to that of the liquid-phase gum discussed previously. Both are brownish-colored, gummy substances that may become quite hard and brittle with age. With this, however, the resemblance stops completely, and the causes of formation and methods of prevention for these two kinds of gummy materials must never be confused, because they are quite different substances.

Several methods for controlling or preventing deposits of vapor-phase gum in customer appliances have been used. Since it is necessary to have all three of the reacting gaseous constituents (nitric oxide, oxygen, and certain unsaturated hydrocarbons) present in gas in order to form vapor-phase gum, it is obvious that the absence of any one of these would prevent trouble from this source.

Some of the processes that have been used for removal of nitric oxide from gas are treatment in equipment that exposes the gas to the action of an electrical brush discharge, passage of the gas through boxes containing fouled iron oxide (iron sulphide), and some very recent experiments in England have indicated removal of nitric oxide coincident with the catalytic removal of organic sulphur from gas.

In addition to the removal of nitric oxide from the gas several other methods of control have been suggested or used, but it is too early as yet to evaluate the practical effectiveness of most of these. However, one means for controlling the vapor-phase gum problem has been the development of a so-called non-stop pilot control which is so designed that stoppage of the control orifice by the finely divided gum mist in the gas is not so likely to occur as in the ordinary control orifice.

Class 4. Material deposited by mechanical pick-up of material from another part of distribution system. This type of deposit goes under the general name of "dust", although the origin and characteristics of the dust may vary considerably between different situations.

The methods used for control of dust, if it is found to be present in a gas system, may be classified under two general principles. The first principle consists in such treatment of the gas that the material on the interior of the mains will remain moist and will not be picked up by the stream of flowing gas. Oil fogging and rehydration are the two chief examples of this type of treatment.

The second principle is the removal of the dust from the gas after it has been picked up from the interior of the mains. In many respects this problem is similar to the removal of tar fog, etc.

One of the most widely used types of equipment for removal of suspended dust from gas is an oil scrubber which sprays the gas with finely divided oil, thereby wetting each particle of dust with an oily film and later removes the oil droplets and the oil-coated dust from the outlet gas; a typical example of this kind of equipment is the Blaw-Knox scrubber.

Other methods that have been used for removal of dust from gas are quite similar to some of those described earlier for the removal of suspended tar and lampblack from gas. These include systems of baffles, filters of various kinds, centrifugal or cyclone-type separators, electrical precipitators, etc.

In addition to the above methods for controlling dust in gas, the so-called non-stop pilot described earlier under deposits of Class 3 has been advocated for use in those situations where dust causes pilot outages.

(Continued on page 53)

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Report of Gas Production Committee

by

C. R. Locke, Chairman

Chicago By-Product Coke Co.,
Chicago, Ill.

The committee work was carried on during the past year by the following subcommittees:

1. Carbonization and Coke—Charles Koons, *Chairman.*
2. Water Gas—R. H. Arndt, *Chairman.*
3. Builders Section—W. E. Steinwedell, *Chairman.*
4. Subcommittee on Survey of Gas, Coke & By - Product Making Properties of American Coals—J. S. Haug, *Chairman.*

The committee presented the following papers at the Production and Chemical Conference held in New York during May:

1. "Time Marches On, Where Is Manufactured Gas Marching"—A. M. Beebee.

This inspirational paper, which was one of the high spots of the Conference, showed in conclusive fashion that the manufactured gas industry was far from being on the way out but that it had a very definite place in "modern streamlined America."

2. "Phases of Holder Operation and Maintenance"—C. S. Goldsmith.

The presentation of this paper was made with the showing of several reels of motion pictures in which the various special repair jobs were pictured in full detail. The paper was a valuable contribution on this highly important and specialized branch of gas works maintenance.

3. "The Manufacture of High B.t.u. Carburetted Water Gas"—H. Vittinghoff.

This paper gave the results of recent tests on the new type reverse blow water gas machines at Niles Center, Illinois, and gave operating figures when manufacturing 800 B.t.u. carburetted water gas.

4. (a) "Coal Expansion During Carbonization in Engineering Models of a Coke Oven"—V. J. Altieri.
   (b) "Determination of the Swelling Properties of Coal During the Coking Process"—V. S. Auvil and J. D. Davis.
   (c) "Practical Significance of Coal Expansion Tests"—C. C. Russell.
   (d) "Coal Expansion"—W. T. Brown.

The above four papers made up an interesting and instructive symposium on the very important subject of coal expansion. This subject is very timely due to the possibilities which its study might reveal in the use of coals when properly blended that were hitherto considered unacceptable for coke oven use, and in the avoidance of coals and coal mixtures which the tests evolved by these studies have shown to be definitely harmful to carbonizing equipment.

The papers show an enormous work in their preparation and the authors are to be congratulated for their fine presentation of this subject.

5. "The Anticipation of Coke Plant Accidents"—Charles Koons.

This paper covering an extremely necessary phase of plant operation deals instructively with hidden hazards, both mechanical and human, and reaches the conclusion that while hidden mechanical hazards can be eliminated by careful inspection and necessary correction, the human element is by far the most difficult to control and requires not only careful examination as to the man's physical fitness for his job but also great care in determining his mental adaptability. The author recommends that in order to minimize accidents free interchange of hidden hazards be made, that aptitude tests be developed for machine operators and supervisors, and finally, that programs for training methods and training courses be laid out as "thoroughly as we have studied engineering of the other kind."

6. "Foundry Coke, An Interpretive Discussion"—B. P. Mulcahy.

This paper presents in interesting fashion some of the fundamental concepts governing the use of coke in cupolas, the specifications governing the finished product, and the methods used in the testing of the coke. The paper also points out the "necessity for a complete correlation of factors governing the coal, the carbonizing conditions of the coal, the resultant coke structure, and the uses of the coke."

7. "A Review of Certain Methods Practiced in the Mixing of Gases"—H. J. Wiedenbeck.

This paper reviews some of the more recent installations which have been installed to control the mixing of various gases to maintain a satisfactory mixture. Gases such as coke oven, water, natural, reformed natural, refinery oil, producer, butane, and high B.t.u. oil gas are used in the various plants described.

(Included in the report are reports of subcommittees Nos. 1, 3 and 4 and papers Nos. 4d and 5.)

Presented at Technical Section, A.G.A. Convention, Atlantic City, N. J., Oct. 12, 1938.

Florida-Georgia Gas Meters Association

The annual meeting of the Gas Meters Association of Florida and Georgia was held September 19 and 20 at Hotel George Washington, West Palm Beach, Florida.

The program included the following papers and addresses:—

Address—Bryan C. Hanks, President and General Manager, Florida Power & Light Company, Miami.

Address—J. W. Lea, Commercial Manager, Consolidated Gas & Electric Company, Atlanta.

General Session

Address—H. R. Cloud, Vice-President and General Manager, Florida Public Service Co., "Public Relations."

Address—Margaret Marabel, Assistant Home Service Director, Servel, Inc., "The Value of Home Service Work in the Promotion of Appliances."

Commercial Section

A. H. Bruning, Chairman

"Value of CP Ranges for Promoting New Customers and Holding Old Customers," J. W. Lea.

"Value of House Heating by Gas to Promote General Use of Gas in the Home," R. L. Blodgett, Secretary-Treasurer, Pennsylvania Furnace Company.

"Why Competition?" C. D. Littlefield, General Manager Peoples Water & Gas Company.

Technical Section

T. Bergman, Chairman

"Use of 100% Coal in Connection with Heavy Oil Process," R. L. Ellis.

"Economics of the Various Types of Gas Oil and Their Uses," John O. Sholar.

"Soil Corrosion Problems," H. P. Thomas, Superintendent Peoples Water & Gas Company.

"Automatic Oven and Broiler Lighters."

"New Top Burner Cock," H. A. Sebald.

Steam As a Purging Agent

By R. E. Kruger

Superintendent of Gas Manufacturing
Rochester Gas and Electric Corporation,
Rochester, N. Y.

WHEN drawing up rules and regulations for proper purging of gas works equipment other than holders it became evident that, while the use of steam for such purposes was an old established practice, there was a lack of definite knowledge of the technical points involved. Steam had been used largely by "rule of thumb" methods, it had usually worked well, but no one knew why. Hence we decided to study the matter and develop some of the technical facts.

A very notable example of the effectiveness of steam purging appears each time the base of a water gas generator is purged by steam after a down run and prior to going into a blasting period. I think I am safe in saying that each time a water gas operator neglects to purge the blue gas from the base of a generator he has an explosion on his hands. This practice is so general and so necessary that it is almost covered up inherently in a water gas cycle be it manually or automatically controlled.

It so happens that blue gas and air mixtures have among the widest of explosion zones. A glance at Table 1 showing explosive range data and analyses of common gases we handle and their analyses will confirm this.

Knowing that it worked so well on blue gas led us to feel that it ought to work even better on other types of gases whose mixtures with air resulted in much narrower explosive ranges. This led some of us to examine the matter of steam purging a bit more closely. In fact we in Rochester became more and more "sold" on the advantages of steam as a purging agent.

We feel that as far as its ability to remove an inflammable atmosphere or air within a container and replace it with an atmosphere that will not burn or support combustion is concerned, steam is most certainly as satisfactory in this action as is inert gas, CO_2, products of combustion or nitrogen. It must be borne in mind that in all purging operations where light oils, naphthalene or any combustible material that will volatilize under relatively small increases in temperature above atmospheric are present along with inflammable gas, that such purging operation is not complete until these materials have all been either bodily removed or have been "topped" to the extent that there cannot be further volatilization after the purging is finished and air admitted to the container. It is to be understood that this removal can be best done by steam principally because the material is subjected to the ravages of steam distillation.

Steam is so generally available on gas works property that its use as a purging medium should be encouraged for purging types of apparatus where the somewhat higher temperatures incident to steam purging are not objectionable. Its use can hence be recommended for purging steel scrubber towers of various sorts and sizes, tubular and direct contact condensers and water gas machines and particularly where inflammable vapors of oil are present as well as stable gas. Cast iron equipment such as long mains, complicated cast iron headers, equipment involving close clearances such as boosters, or old type center seals or equipment with large and effective condensing surfaces such as holders, wet meters, etc., should not be purged with steam because the somewhat higher temperatures may produce excessive strains and cause flange leaks or cracking, or cause excessive condensation. When purging with steam enough steam must be admitted to maintain a positive pressure on the vessel being purged. Some of this steam will condense to water which will trickle down to the bottom of the container where it should be drawn off continuously so as not to put an overload on the container foundations, and because this water may contain certain dissolved salts and certainly carries with it considerable oils. The water resulting from such condensed steam aids very materially the purging operation.

When purging a container with steam, one actually operates the container as a reflux condenser.

In summary, steam is an efficient purging medium by reason of:

1) Direct displacement.
2) Steam distillation.
3) Relatively high temperatures.
4) Washdown brought about by a varying amount of steam condensing.

One of the drawbacks to steam purging has been the inability of the operator to determine the endpoint, in other words to know definitely when the purging operation is complete. We took as our job the problem of determining ways and means of doing just this. It is a comparatively simple matter to determine the endpoint of steam purging when

Table 1

ANALYSES AND EXPLOSIVE LIMITS OF COMMON GAS MIXTURES

Gas	CO_2	*Ill.*	O_2	*CO*	H_2	CH_4	N_2	*B.T.U.*
Mixed Gas	2.40	3.42	0.84	12.68	45.20	24.58	10.84	541.4
Coal Gas	2.58	2.74	0.58	9.60	45.50	28.14	10.86	546.2
Oven Gas	1.82	3.68	0.52	6.32	53.98	31.60	2.08	624.6
Carb. Blue Gas	4.08	7.66	0.72	31.00	36.58	13.24	6.72	551.6
Producer Gas	6.04	...	0.14	27.10	12.06	0.78	53.88	134.8
Dry Quencher Gas	6.38	...	0.16	12.04	18.24	1.54	61.64	114.0
Blue Gas	6.18	...	0.28	39.15	48.98	2.30	3.13	309.5

	Lower Limit			*Upper Limit*		
Gas	*Gas*	O_2	*Air*	*Gas*	O_2	*Air*
Dry Quencher Gas	12.0	18.3	88.0	74.0	5.4	26.0
Producer Gas	20.0	16.6	80.0	74.8	5.2	25.2
Blue Gas—Uncarb.	6.9	19.4	93.1	70.5	6.1	29.5
Carb. Blue Gas	6.0	19.6	94.0	40.0	12.5	60.0
Mixed Gas	5.5	19.7	94.5	32.0	14.1	68.0
Coal Gas	5.4	19.7	94.6	31.8	14.2	68.2
Oven Gas	4.9	19.8	95.1	29.1	14.8	70.9

Presented before Technical Section, A. G. A. Convention, Atlantic City, N. J., October 12, 1938.

QUIGLEY SERVICE Renders Valuable Help in Emergency

Helps Put Gas Plant in Operation When Flood Deluges Main Works and Hurricane Wrecks Gas Holder.

The September 21st hurricane, flood and tidal wave left a wake of destruction in and around Providence, R. I. No electric power. City isolated. Business suspended. Property damage untold millions.

Providence Gas Works' entire 40 acres submerged. Electric generators and motors flooded. Gas holder destroyed. No electricity to run coke ovens. Company fell back on carburetted water gas plant, run only intermittently. Fire clay linings and brick bond of water gas sets had spalled considerably,

Quigley Serviceman at Work.

Plant of Providence Gas Works as Raging Flood Waters Deluged Yards and Equipment.

Photo by Chas. S. Williams, Jr.

and concern was felt as to how long they would last. Sets had to be patched due to clinkers being barred off to keep them in working condition.

Gas company called Frank M. Leach, Quigley Co's., Pawtucket Manager. Leach went to Quigley warehouse. Got enough material to repair the sets, and, with the QUIGLEY REFRACTORY GUN which Providence Gas Co. has, surfaced these linings with material which prevented further erosion.

All of this patching was done without a shutdown, a task that would have been nearly impossible to accomplish in any other manner.

Only after helping with all this work, with the light of two candles, had Leach time to write his report. (See photo above.) Many dwellings within a block of his home were destroyed.

The Quigley organization has many experienced Service Engineers ready to give practical advice and assistance to industries, that plants may operate efficiently at minimum maintenance cost.

East Providence Gas Holder Destroyed by Hurricane September 21. 1938

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only air or gas is being purged out but where the gas is associated with volatile products as in a light oil scrubber it became a more involved matter.

In this work it must be borne in mind too that any good chemical staff could at any time, determine the endpoint of steam purging prior to our work but I think it will be admitted that the methods used would be much too slow and cumbersome to be the least practical. It seems obvious that for something to be practical it must be simple, it must be direct and it must be accurate so at the very beginning we avoided the complex and strove always for simplicity and accuracy.

For instance purging, we took to mean to drive out completely that which is within. Say a new light oil scrubber is to be put into operation. The air in it must first be removed else we run into an explosive mixture when gas is admitted.

We use steam to drive out the air and then use gas to drive the steam either ahead of it into the system or out to the atmosphere and if we do this correctly we completely side step any explosive mixture. Now anyone can do this and no doubt some of you have done it many times but I venture to say that you did not know definitely when the steam had completely driven out all the air. In other words you couldn't easily determine the endpoint and if you are a good operator you probably steamed altogether too long just to make sure that the air was all out and that is excellent practice in the absence of a definitely assured endpoint.

One of the jobs we undertook was to develop means whereby one can tell definitely when steam has driven out all of the air. The theory back of this part is: Steam when cooled to atmospheric temperature or thereabouts will condense to water and air cooled to the same temperature will not condense and neither will manufactured or natural gas. If then we put steam under slight pressure into our light oil scrubber filled with air the steam will force the air out, a matter of direct displacement, and soon one will get both steam and air at the exit vent. If now you will entrap a section or a sample of these purge vapors in an apparatus not unlike an ordinary Orsat sampling tube and bottle, the steam can be very easily condensed to water by the water in the leveling bottle and the balance of the sample must be air and if the sampling tube fills completely with water then no air is present in the purge vapors at the outlet of the light oil scrubber and it is purged. The modified Orsat sampling tube we use for this work is known as a Steam Purge Indicator. A detailed description can be found in Appendix "A."

Now all gas and air mixtures have a definite explosive range depending chiefly upon the relative percentages of gas and air present in the mixtures but at either end of this explosive range lies a gas and air mixture that will not explode under any provocation; on one end there is too much air and not enough gas while on the other end there is too much gas and not enough air. These data are shown in Table 1. Theoretically then not all the air needs be purged from our light oil scrubber before gas can safely be turned into it but there again it is awfully good practice to purge until not more than 1¼% of air is present in the purge gases. This avoids all technicalities and is even better than safe practice. When this point is reached the steam may be turned off and gas immediately admitted to the container in enough volume to always maintain a positive pressure or, if one wishes, the steam may be cut back and gas admitted along with the steam and then the steam gradually closed off. The latter is usually the handier way to do it and it is easier in this way to always maintain a positive pressure.

For purging a light oil scrubber having only gas in it the procedure is exactly the same, the endpoint determined in exactly the same manner and the purging carried on until the purge vapors contain less than 1¼% of gas.

It so happens, however, that light oil scrubbers and most gas works equipment contain light oils and other volatile products of various kinds, perhaps in rather large quantities in sludges and scrubber packing. These oils too must be removed or severely "topped" before it will be safe to open the scrubber to atmosphere and it is because of this that the endpoint of steam purging becomes a bit more complicated but fortunately the complications can be side stepped and still be thoroughly respected. It is done in this way:

When the scrubber has been purged of gas as determined by the Steam Purge Indicator an ordinary good condensing coil consisting of about 20 ft. of ¼ inch copper tubing is attached to the exit where the Indicator readings were taken and at intervals a continuous sample of the purge vapors (consisting of steam and light oil vapors) is condensed and caught in an ordinary 100 cc. cylinder. The water of course will settle to the bottom leaving the oil as a top layer. Continue steaming until check sample contains less than 5% of oil. Presumably steam may then be shut off but it so happens that there is not a direct relationship between the amount of steam passing through our light oil scrubber and the amount of oil being removed and for that reason we change the steaming rate by cutting it in half or thereabouts and collect another series of samples. The percentage of oil will increase unless the scrubber is completely purged. When the check samples show 5% or less of oil the steaming rate is again decreased and the sampling continued until checks show 5% or less of oil. It may be necessary to repeat this procedure several times, although experience with known types of equipment in your plant has a tendency to make it unnecessary.

The presence of oil and oil vapors in equipment complicates the situation with respect to purging, regardless of whether steam or any other type of purge gas is used. The problem is not concerned particularly with getting rid of the oil vapor alone, but also in getting rid of the liquid oils and sludges from which more oil vapors may be derived during the purging period and even subsequent to it. In fact, this latter period may be considered even more important than the purging period itself from the standpoint of safety.

The complete elimination of oil from an apparatus like a light oil scrubber, packed with oil soaked wooden grids, is hardly possible by inert purging alone. The problem, therefore, becomes one of reducing the vapor pressure of the oil to a point where it will not vaporize a sufficient quantity to become a hazard. The steam we use does this "topping." The procedure is based on the fact that the rate of volatilization of the oils is largely a function of temperature and that the steam acts as a carrier of the oil vapors produced at that temperature. Since by decreasing the steam flow through the light oil scrubber the temperature is only very slightly affected and the pressure is reduced slightly, it follows that the vapor pressure of the oil remains fairly constant and hence the volatilization remains fairly constant. But since the steaming rate is materially reduced the steam at the vent will contain a higher percentage of oil vapor if there is yet enough oil in the scrubber to produce them. In summary the change of relationship between steaming rate and oil volatilization is an index of the degree purging has taken place and

when steam can no longer volatilize 5% or more oil then certainly air at atmospheric temperature cannot volatilize that oil and the scrubber is ready to be opened to air.

It may seem that this determination too could be made with the steam purge indicator. Theoretically it could be done but one must then work with extremely small samples and hence be subject to enormous errors. This can be aptly shown by the following comparison. The S.P.I. has a vapor capacity of 400 cc. whereas 100 cc. of water (condensate at outlet of condenser coil) is equivalent to about 169,000 cc. of steam (vapor) at 212° F. and atmospheric pressure. It is evident that by obtaining 100 cc. of condensate we are working with a very much larger sample of steam and other vapors, and hence greater accuracy can be attained. The detailed directions for using the S.P.I. apparatus is given in Appendix "A."

Some might feel that the Steam Purge Indicator readings are seriously in error because they obviously do not take into account gases that may be dissolved in the steam and gas or air sample taken for endpoint determinations.

We investigated this rather thoroughly and of course found the water in contact with the sample within the S.P.I. did contain dissolved gases but the amounts going into solution are extremely small and the endpoint of purging deals with such a small volume and is so far safe that the influence of dissolved gases of the combustible variety as well as dissolved oxygen can be neglected. Our work indicates that the amount of these constituents present in the 400 cc. of water in the S.P.I. varies, in the following manner.

Illuminants	.4 cc.- .8 cc.
Oxygen	.8 cc.- .68 cc.
Carbon Monoxide	.00 cc.- .28 cc.
Hydrogen	.00 cc.-1.48 cc.
Methane	.2 cc.-1.28 cc.

The inert gases of Carbon Dioxide and Nitrogen dissolve to a much greater extent and this of course leads again to super safety. In steaming our light oil scrubber we find that as purging progresses the gas at the purge outlet contains an unusually large amount of carbon dioxide. We have been at a loss to explain this. It may conceivably be the result of the decomposition of some carbonate by the action of the steam. But again we must still account for the carbonate. It may perhaps be ammonium carbonate or bicarbonate. We don't know yet where it comes from. We're only guessing. The following tabulation among other things shows the range covered by the carbon dioxide at the purge outlet.

Others might feel that when purging a container having no oils present the endpoint of 5 cc. of noncondensible is too large. But again we feel we have "played way safe." Even if we had a container filled with hydrogen and we purged until our gas and steam sample had in it only 5 cc. of noncondensible gas we would be far safer for careful calculation indicates that anything less than 12 cc. would be safe as far as the lower explosive limit of hydrogen and air mixtures are concerned. And if we are amply safe on hydrogen we are safe in all ordinary gases found in the gas works because it takes less hydrogen to make an explosive mixture with air than another gas or a mixture of gases found in our gas works.

A table showing many relationships of this sort is given below.

So much then concerning the endpoint when purging out only air or simple gases free from oil vapors.

When purging a container having in it oil vapors as well as simple gases all the foregoing can of course be ignored because in all cases all the simple gases are expelled completely long before the condensed oil and steam samples at the outlet indicate that the container is purged of the volatile oil vapors to a safe degree. The safe point we set at 5 cc. of oil in 100 cc. of total condensate.

SUMMARY OF VOLUMES FOR TEST NO. 5

Steam Purge Rate 692 Lbs./Hour

Total Volume in Cu. Ft. at 100° F. and 30" Hg.					*Anal. of Uncondensed Gas*		
Steam	*Oil Vapor*	*Uncond. Gas*	*Disld. Gas*	*Sum Total*	*Time*	*CO_2%*	*Ill.%*
					Orig. Gas	3.0	3.6
0.000	0.000	29.90	.000	29.90	12:00	4.4	5.7
0.045	.009	18.92	.000	18.98	12:25	4.6	5.6
1.814	.266	18.63	.000	20.71	12:45	5.8	6.4
16.67	.863	4.41	.004	21.94	1:00	6.5	4.7
16.72	.628	2.01	.004	19.36	1:14	7.5	6.4
17.22	.672	1.583	.004	19.48	1:25	8.1	6.6
18.10	.585	1.051	.005	19.75			
18.92	.580	.735	.005	20.24	1:36	9.7	6.7
20.07	.611	.568	.005	21.25			
21.07	.593	.378	.005	22.04	1:48	11.7	6.8
21.64	.554	.251	.005	22.45			
21.41	.558	.178	.005	22.15	2:01	14.3	7.6
38.92	.521	.208	.010	39.66	2:16	18.0	7.8
42.23	.921	.114	.011	43.27	2:20	19.3	7.8
41.46	.841	.068	.010	42.38	2:37	22.0	7.6
41.87	.772	.046	.011	42.70	2:54	24.8	8.5
44.02	.755	.042	.011	44.83	3:15	28.1	7.5
165.31	2.464	.114	.041	167.93	3:40	29.7	8.0
170.16	2.251	.105	.043	172.56	3:55	31.5	8.2
122.43	1.465	.069	.931	124.00	4:10	32.9	8.0
					4:25	33.2	8.2
					4:50	35.4	8.5
					5:10	35.8	9.1

EXPLOSIVE LIMITS AND THE STEAM PURGE INDICATOR READINGS

	Lower Explosive Limit		*Lower Explosive Limit Vol. at 212° F. Reduced to 75° F.*	*Maximum S.P.I. Reading*
	At Approx. 75° F.	*At Approx. 212° F.*		
Pure Gases	*Per Cent Gas in Air*			
Hydrogen	4.0	3.7	2.9	12 ml.
Carbon Monoxide	12.5	11.5	9.2	37 "
Methane	5.0	4.6	3.7	15 "
Ethane	3.22	3.0	2.4	10 "
Fuel Gases				
Natural	4.8	4.4	3.5	14 ml.
Mixed	5.5	5.1	4.1	16 "
Coal	5.4	5.0	4.0	16 "
Oven	4.9	4.5	3.6	14 "
Carbureted Blue	6.0	5.5	4.4	18 "
Blue	6.9	6.3	5.0	20 "
Producer (Coke)	20.0	18.4	14.6	58 "

This is based on the fact that the lower explosive limit of such oils as are encountered in a gas plant and air mixtures contain not less than 1.0% oil vapor and not more than 99% air.

If we have at the end of our purging 5 cc. of crude light oil and 95 cc. of water we say that the container may be opened to the atmosphere because of the 5 cc. of oil when converted to a vapor in the pressure of air will give an oil vapor and air mixture below the lower explosive limit.

If the 5 cc. of oil have a molecular weight greater than crude light oil the 5 cc. we have set as a limit is just that much safer. We have based our limit on the oil which could the most easily lead us into danger and if conditions meet that requirement it will meet the requirements of all oils encountered in the gas plant.

We feel that by setting the limit at 5 cc. we have a reliable endpoint when oils are present. There is however not the slightest objection to purge to a lower amount or to purge to a total absence of oil if one so desires. The main point we wish to make is that there is a means of determining the true endpoint of steam purging. If anyone wants to go further than that certainly he cannot walk into danger by doing so. The removal or "topping" of oils when purging is a most important matter absolutely regardless of the purging medium one may choose to use. In this connection steam has inherent advantages.

The following table presents some data on lower explosive limits of various light oils and the corresponding minimum percentages of oil in total condensate if translated to endpoint readings.

mixtures for paraffin and aromatic hydrocarbons. That is, a mixture of the lower explosive limit concentration of the respective oil vapor plus the remainder as steam on condensation will give the per cent of liquid oil in the condensed mixture which is indicated in Column V.

A typical calculation showing the conversion of endpoint data to lower explosive limit data is given above.

The *Steam Purge Indicator* and cooling coil are to be used for determining the endpoint when various types of equipment are purged with steam. It will indicate when sufficient steam has been introduced so that no possible explosive mixture could be formed during the subsequent introduction of inflammable gas or air into the purged unit.

A sample of purged vapor taken in the *Steam Purge Indicator* (S.P.I.) is cooled, the steam is condensed, and the volume of non-condensible gas remaining is taken as a measure of the amount of air or gas in the sample. The use of this simple apparatus is limited to cases in which insoluble and non-condensible gases are being purged. Highly soluble gases are not commonly encountered in purging, but condensible oil vapors are; hence, the *Steam Purge Indicator* is supplemented by an additional test which shows the relative amount of such oil vapors and the point to which they must be reduced in the purging operation. This is very simply accomplished by condensing a sample of the purged mixture and determining the relative proportion of oil and water in the condensed mixture after it has separated.

Calculation of Maximum Value of 5 ml. of Oil in 100 ml. of Condensed Purged Vapors

1. Consider an oil like C.L.O. with a lower explosive limit of 1.0% by vol. in air, and a molecular wt. of 100.
2. Consider also a container holding 100 cu. ft. at 60° F. and filled with a mixture of 1.0% C.L.O. vapor and 99% water vapor or steam.
   a. There is then present in the container 1.0 cu. ft. of C.L.O. vapors of molecular wt. 100 which when condensed will occupy

$$\frac{1.0\ \text{ft.}^3}{380\ \text{ft.}^3} \times 100\ \text{lbs.} = 0.2632\ \text{lbs.} \times 453.6\ \text{grams/lbs.} = 119.4\ \text{grams C.L.O.}$$

$$\frac{119.4}{0.890} = 134\ \text{ml. C.L.O.}$$

   b. The remainder of the volume in the container is 99 cu. ft. of water vapor or steam. When condensed this volume of steam will occupy

$$\frac{99.0\ \text{ft.}^3}{380\ \text{ft.}^3} \times 18\ \text{lbs.} = 4.69\ \text{lbs.} \times 453.6\ \text{grams/lbs.} = \begin{matrix} 2127 \\ 2127\ \text{or ml.} \\ \text{negligible} \end{matrix} \begin{matrix} \text{grams of } H_2O \\ \text{of } H_2O \end{matrix}$$

   c. $\frac{134}{2261} = 5.9\%$ C.L.O. in condensed mixture.
3. As a factor of safety, the value was set at 5% in place of 5.9% as calculated above.
4. The lower explosive limit of most industrial oils can be taken as 1.0% by volume in air.

APPENDIX "A"

Apparatus

The apparatus required for determining the endpoint in steam purging includes:

(a) *The Steam Purge Indicator* (S.P.I.) as shown in Figure II.

(b) A cooling coil, made from 15-20 ft. of ¼-inch copper tubing as shown in Figure I.

(c) Two 100-ml. graduated cylinders for collecting and measuring the condensed oil-water mixture also shown in Figure I.

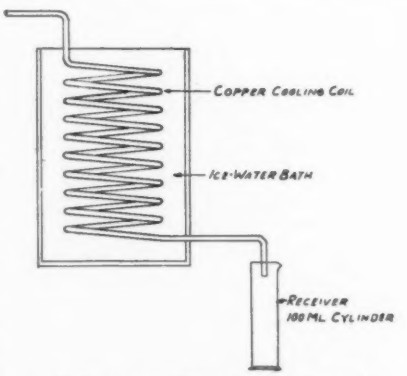

Figure I. Condensing coil and measuring cylinder

PER CENT LIQUID OIL IN CONDENSATES AT LOWER EXPLOSIVE LIMIT CONCENTRATION OF OIL VAPOR VOLUMES IN OIL-STEAM MIXTURES FOR PARAFFIN AND AROMATIC HYDROCARBONS

Paraffins	*Mol. Wt.*	*Lower Explosive Limit*	*Sp. Gr.*	*% Oil in Condensed Mixture*
Hexane	86	1.25	.659	8.4
Heptane	100	1.00	.684	7.6
Octane	114	0.95	.703	8.0
Nonane	128	0.83	.718	7.7
Decane	142	0.67	.730	6.8
Aromatics				
Benzene	78	1.41	.879	6.6
Toluene	92	1.27	.867	7.0
Xylene	106	1.0	.880	6.3
Crude Lt. Oil	100	1.0	.890	5.9

The above shows the per cent liquid oil in condensates at their lower explosive limit concentration of oil vapor volumes in oil-steam

Description of Apparatus

A diagram of the *Steam Purge Indicator* (S.P.I.) is shown in Figure II. It consists essentially of a Pyrex glass container graduated at its upper portion, a thermometer inserted in a well in the main body of the container, an upper two-way stopcock, and a lower three-way stopcock. The main body of the *Steam Purge Indicator* consists of a two and one-half inch Pyrex glass tube, approximately six inches long, while the upper calibrated portion consists of a Pyrex tube one and one-quarter inches in diameter and two and one-half inches long. The total capacity of the *Steam Purge Indicator* is 400 ml. The upper stopcock has an opening of approximately 10 mm. bore while the lower stopcock has openings of approximately 10 mm. bore and 6 mm. bore. The outlet tube from the approximate 10 mm. bore on the lower stopcock discharges vapor directly to the atmosphere, while the narrower tube is connected by means of a rubber hose to a one-quart aspirator bottle. The *Steam Purge Indicator* is enclosed in a sheet metal case with proper insulation to afford easy handling as well as to prevent undue condensation, as shown in Figure II. The overall dimensions of the complete *Steam Purge Indicator,* excluding the aspirator bottle, is a cylinder six inches in diameter and 22 inches high.

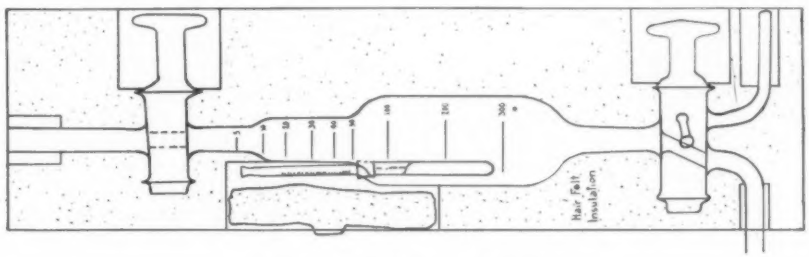

Figure II. Steam purge indicator

The cooling coil consists of 15-20 ft. of ¼-inch copper tubing placed in a suitable container as indicated in Figure I. A 100-ml., graduated cylinder is used for collecting and measuring the condensed oil-water mixture. An adequate supply of cooling water or ice should be available to reduce the condensate mixture to approximately 70° F.

Operation

Before using the *Steam Purge Indicator* (S.P.I.), air from the small bore section of the lower stopcock should be removed by connecting with the aspirator bottle and displacing the same with water in the usual manner. Equipment purged with steam is always maintained at a positive pressure. Hence, the *Steam Purge Indicator* is connected directly to the equipment being purged with as short a connection as possible. A heavy-walled rubber tubing will be found satisfactory. The upper and lower stopcocks of the *Steam Purge Indicator* are then opened wide, allowing vapor to pass freely through the indicator. Such purging shall be continued until the thermometer in the *Steam Purge Indicator* reading remains constant. This usually takes from 3 to 5 minutes. When this point has been reached, both stopcocks are turned simultaneously through 90° entrapping a 400-ml. sample. The lower stopcock is immediately turned an additional 90°, thus connecting the sample tube with the aspirator bottle, allowing water from the leveling bottle to enter the *Steam Purging Indicator.* Bring to atmospheric pressure by adjusting the water levels and note the amount of non-condensible gas.

The cooling coil is attached to the sampling tube from which the purge vapors issue, and should reduce the temperature of the condensed mixture to approximately 70° F. either by the use of ice or enough cooling water. The volume of oil in the condensed mixture is read directly.

The temperature, as indicated by the thermometer in the exit vent, can be used to follow the course of the steam purging.

Purging Gas Plant Equipment

Equipment Is Filled with Inflammable Gas and Is To Be Taken Out of Service,

or

Equipment Is Filled with Air and Is To Be Placed in Inflammable Gas Service.

The proper connections are made and purging with steam started in the usual manner. At intervals, samples of the vapor within the equipment are taken in the *Steam Purge Indicator* (S.P.I.), and the amount of non-condensible gas determined by the procedure outlined above. Continue purging until the *Steam Purge Indicator* readings are 5 ml. or less. When this point has been reached, the *Steam Purge Indicator* is removed and the copper cooling coil connected in its place. The cooling coil is operated continuously, and a series of condensed oil-water mixtures collected in 100-ml. measuring cylinders. Purging is continued until the fraction of oil in these condensed oil-water mixtures is less than 5% of the total. When this point has been reached, the rate of steam introduction should be reduced approximately 50%, and a second series of condensed oil-water mixtures is collected at this reduced steam rate until the fraction of oil in the condensed mixture is less than 5%. When this point has been reached, the rate of steam introduction should be again reduced by approximately 50%, and a third series of condensed oil-water mixtures collected at this reduced rate until the fraction of oil in the condensed mixture is less than 5%. Finally, the rate of steam purging shall be reduced until only a slight positive pressure exists within the equipment when a fourth series of condensed oil-water mixtures is collected at this reduced rate until the fraction of oil in the condensed mixture is less than 5%. At this point the vapor volume existing within the container will be less than 1% oil vapor which is the minimum lower explosive limit for industrial oils. This represents the endpoint of steam purging, and the equipment is ready for admission of air or inflammable gas as the case may require.

The temperature, as indicated by the thermometer in the exit vent, is also used to follow the course of steam purging. When a temperature of 210° F. is indicated at the minimum steam purging rate, it supplements the data already collected that the safe endpoint of steam purging has been reached.

Interpretation of Results

The *Steam Purge Indicator* (S.P.I.) readings give a measure of the amount of inflammable gas or air in equipment depending upon the nature of the purging operation and indicates when such inflammable gas or air have been replaced with steam. The supplementary tests performed by condensing the purged vapors and measuring the fraction of oil in the condensed oil-water mixture, indicate the amount of oil vapor present

(Concluded on Page 76)

Variations in Interchangeability Formulae in High B. t. u. Gases

by
Leon J. Willien
Chief Gas Engineer
Public Utility Engineering and Service Corporation
Chicago, Ill.

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LEON J. WILLIEN

There are four factors inherent in the utilization of gas. They are:

1. Specific Gravity.
2. Heating Value.
3. Chemical Composition.
4. Gas Line Pressure.

The first two are dependent upon the third though their aspects are of a physical rather than of a chemical nature. The fourth is independent of the other three, being entirely a function of the relation between the distribution equipment and the demand.

The replacement of manufactured gas with natural gas and mixtures of natural and manufactured gases has brought with it a problem of interchangeability of gases for peak loads and emergency use.

In connection with its research on mixed gases, the A.G.A. Testing Laboratory developed an empirical formula for determining limits in mixing city gases. This formula is as follows:

$$C = \frac{ht\ At\ da}{ha\ Aa\ dt} + \frac{(ha\ Aa}{(5000\ Ea\ Fa} - \frac{ht\ At)}{5000\ Et\ Ft.)}$$

Where:

C = index of change in performance of appliances. For continued satisfactory performance of appliances when the gas on which they have been adjusted to perform satisfactorily (adjustment gas) is to be replaced by another gas (test gas) the value of C should be held between 0.85 and 1.15,

h = gross or total heating value, B.t.u. per cu. ft.,

A = air theoretically required for complete combustion, cu. ft. per cu. ft. of gas,

d = specific gravity (air = 1.0),

E = the heat capacity of the theoretical products of combustion 60° F. to 1600° F., B.t.u.,
= $0.029VCO_2 + 0.023VH_20 + 0.0189VN_2$, where V = volume of each product as indicated by the respective subscripts CO_2, H_2O and N_2 formed by the combustion of one cu. ft. of gas with the air theoretically required for complete combustion, cu. ft. and 0.029, 0.023 and 0.0189 = heat capacity of each product of combustion 60° F. to 1600° F., B.t.u., per cu. ft.

F = summation of the products of the mol fraction and a constant resolving each combustible constituent to the basis of equivalent free hydrogen.
= $H_2 + 5.36\ CO + 35.2\ Ill. + 27.3\ CH_4 + 38.7\ C_2H_6 = 80.8\ C_4H_{10}$, where H_2, CO, Ill., etc. = Mol fraction of each combustible constituent in the gas, and

a and t = subscripts designating the adjustment gas and test gas respectively.

Since the most tedious part of the A.G.A. Formula is calculating the values of Factors E and F, it was suggested that these factors be omitted. Omitting these factors would not eliminate the need of analyses of the gases which it may be desired to mix, because it would be still necessary to calculate the theoretical air required for combustion. Knowing that the heating value of a mixture of gas and the theoretical air required for combustion is practically constant for all gases, it was believed that the theoretical air required for combustion of a gas could be calculated from the heating value of the gas. From 31 analyses of gases ranging from 123 to 3170 B.t.u. the theoretical air required for combustion was calculated and the B.t.u. per cu. ft. of gas and theoretical air mixture determined. This study showed that for gases of 300 B.t.u. per cu. ft. or higher, the average heating value per cu. ft. of gas and theoretical air mixture was 96 B.t.u. The maximum was 100 B.t.u. and the minimum was 93.5 B.t.u. As a result of this study it is believed that if given the heating value of a gas, the theoretical air required for combustion can be calculated from the following simple formula or equation.

Cu. ft. of theoretical air required per cu. ft. of gas $= \frac{\text{B.t.u. of Gas}}{96} - 1.0$. The results should be accurate within 4% of gas of 300 B.t.u. or higher.

The simplified A.G.A. formula would therefore be resolved to the following:

$$C = \frac{ht\ At\ da}{ha\ Aa\ dt} + \frac{(ha\ Aa}{(\ 5000} - \frac{ht\ At)}{5000\ )}$$

Proposed Simplified Formula

The following method for calculating the interchangeability of gases is proposed. All that is required is the B.t.u. per cu. ft. and specific gravities of the gases.

Basis

1. That the mixture of primary air and gas in the burner head of an atmospheric burner has a heating value of 175 B.t.u. per cu. ft. when properly adjusted.
2. That the gas pressure back of the burner is the same with the different gases.
3. That the size of the gas orifice is the same with the different gases.
4. That the flow of gases through an orifice varies inversely as the square root of the specific gravity.
5. That the primary air injected into the burner head of an atmospheric burner is the same in cu. ft. per hour regardless of the specific gravity of the gas.

Let

Ha = B.t.u. per cu. ft. of adjustment gas

Ht = B.t.u. per cu. ft. of test

Ga = Specific Gravity of adjustment gas

Gt = Specific Gravity of test

Abstract of a Paper Presented before Technical Section at A. G. A. Convention, Oct. 13, 1938.

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● The Gas Industry is going places. Not in years has there been so much drive behind load building efforts as at present. Industrial, commercial and domestic consumers are learning about the advantages of gas, through national and local advertising, and from aggressive sales effort.

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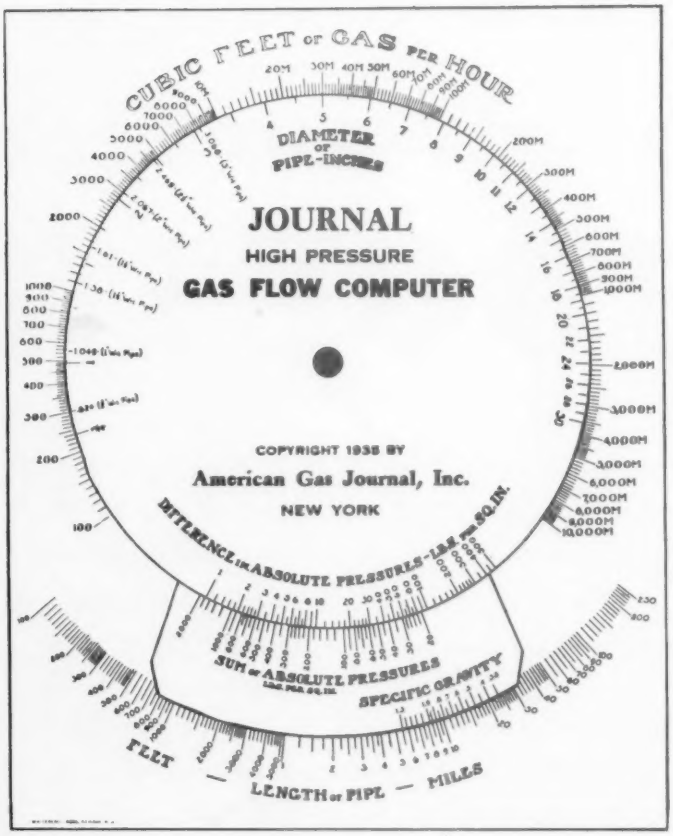

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Difference in Absolute Pressure—Lbs. per sq. in. 1-500
Sum of Absolute Pressures—Lbs. per sq. in 2000-20
Specific Gravity 1.5-.35
Length of Pipe—Feet 100-5000
Length of Pipe—Miles 1-250

Low Pressure Computer Range:

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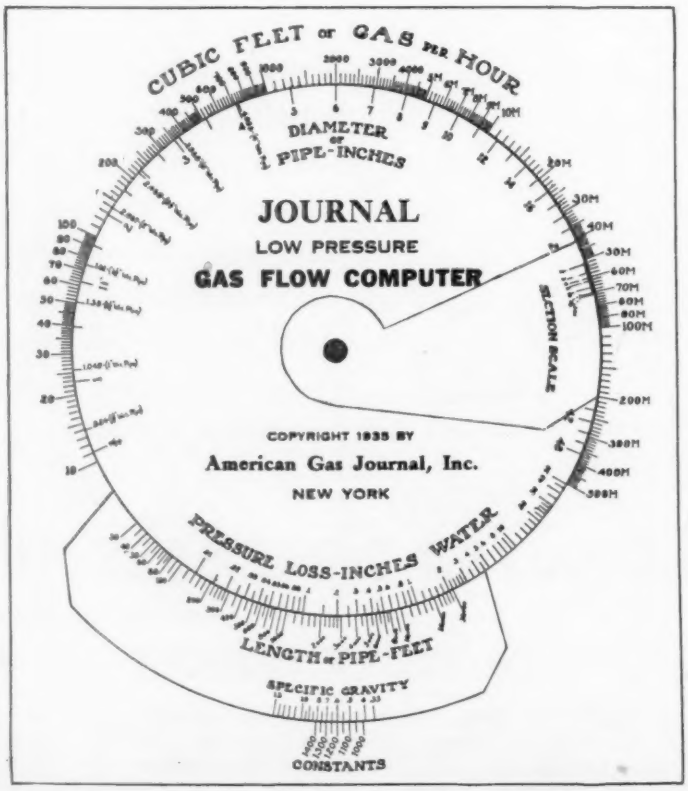
Pressure Loss Inches .01-10.
Length of Pipe—Feet 30-30,000
Specific Gravity 1.5-.35
Constants 1400-1000

Price $3.50 Each, Postage Prepaid



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Primary Air-Gas Ratio with Adjustment Gas

Since the heating value of the primary air and gas mixture in the burner head it 175 B.t.u. per cu. ft., the percentage of gas in the mixture will be:

$(175/Ha) \times 100$ Equation A

The percentage of primary air in the mixture will be 1.0—A

Equation B

The cu. ft. of primary air per cu. ft. of gas will be B/A Equation C

Gas Supply to Burner Head

If the gas supply to the burner head through the gas orifice is 1.0 with the adjustment gas, the gas supply with the test gas will be:

Square Root of Ga Equation D
Square Root of Gt

B.t.u. Input to Burner

Assume the B.t.u. input to the burner with the adjustment gas to be the same as the B.t.u. per cu. ft. or Ha. The B.t.u. input to the burner with the test gas will be:

$Ht \times D$ Equation E

B.t.u. per cu. ft. of Primary-Air Gas Ratio

The B.t.u. per cu. ft. of primary-air and gas mixture in the burner head with the test gas will be:

$$\frac{E}{C + D}$$ Equation F

Applying this method to 131 gases and checking it with the A.G.A. Formula, the results indicate:

1. That for the test gas to be interchangeable with the adjustment gas, F should be between 165 and 185.
2. That if F is less than 165 the gas will burn with a hard flame and tend to flash back. If F is more than 185 the combustion will be incomplete.
3. That the method is more applicable to gases above 500 B.t.u. than gases less than 500 B.t.u.

Conclusions

Based upon my experience on the interchangeability of gases, I do not believe that any one of the formulae proposed will give reliable results. The only way to determine whether one gas can be substituted for another is to try them in actual practice. This applies particularly with gases of 700 B.t.u. or higher.

Additional papers presented before the Technical Section were as follows:

Sales and Service, B. T. Franck, Grand Rapids Gas Light Co., Grand Rapids, Mich.

The Engineering Significance of the National Bureau of Standards Soil Corrosion Data

by

Kirk H. Logan

National Bureau of Standards
Washington, D. C.

This paper deals with the use of National Bureau of Standards' data on soil corrosion in the estimation of the corrosion to be expected on pipes, and is an attempt to express the corrosiveness of the soils investigated in terms which can be readily understood. The equations which are used in the estimation of the corrosiveness of soils have been developed by others and most of them have been published in technical journals.

CONTENTS

I. Introduction.
II. Factors affecting the depth of pits.
  1. The effect of time on the depth of the maximum pit.
  2. The effect of inspected area on the observed depth of the maximum pit.
III. Extrapolation of Bureau of standards soil corrosion data.
IV. Comparison of test data with field experience.

(An abstract of a paper in the Journal of Research of the National Bureau of Standards. This abstract has not been released for publication.)

Abstract of Paper Presented before Technical Section at A. G. A. Convention, Oct. 13, 1938.

A Primer on Deposits

(Continued from page 43)

Class 5. Material deposited by chemical reaction between gas constituents and metal. As mentioned earlier this type of deposit is that formed by the chemical reaction between metal and constituents of the gas, or, using the word generally applied to this action, is corrosion.

The constituents of gas that are the most generally regarded as contributing to corrosion of the interior of gas distribution systems are oxygen, water, carbon dioxide, cyanogen (HCN), hydrogen sulphide, organic sulphur, and ammonia. Several years ago a bibliography and summary of the subject of corrosion by gas was prepared.

Where trouble of this type is encountered it may be brought under control by (1) substituting a corrosion-resistant metal for the iron or copper or brass used in the affected control part of the appliance, or (2) decreasing the cyanogen and/or the organic sulphur content of the gas before it leaves the plant.

3. SOME SIMPLE TESTS TO DETERMINE NATURE OF STOPPAGE

Quite often, it will be possible to determine the type of material that is causing stoppage trouble by making some comparatively simple tests without the aid of laboratory equipment, or at the most, very simple equipment that is usually present in even small gas plants.

First general case—large deposits in mains. This is usually very easy to diagnose. The only materials that can form deposits of this magnitude are water, ice, hydrates, naphthalene, and dust A simple visual examination will therefore generally determine the character of the stoppage material and the proper corrective measures may then be taken for control of the situation.

Second general case—moderately large deposits in governors, valves, compressors, meters, and small pipes. In many instances the source of this trouble may be traced by means of simple tests, but in many other instances the deposits causing the trouble will be such a complex mixture of various materials that it will be necessary to make a more comprehensive study involving laboratory facilities not available in most of the small gas plants.

A. G. A. Industrial Gas Section Adds Smith on Publicity

Returning to the gas industry after two years in the field of non-ferrous metal publicity and advertising, Harry W. Smith, Jr., formerly of the A.G.A. Testing Laboratories, this month assumes the post of Director of Industrial Publicity for the American Gas Association. Mr. Smith's efforts will point towards stimulating interest in the use of gas for metallurgical, ceramic, baking, commercial cooking and water heating, institutional, hair drying, and general manufacturing and commercial purposes, through the technical, trade and business press.

An engineering graduate (Case School of Applied Science 1930, Princeton 1931) Mr. Smith has served with the Bell Telephone Laboratories and the A.G.A. Testing Laboratories both at Cleveland and Los Angeles as a research engineer. His experience in gas publicity began at the Cleveland Laboratories of the Association in 1932 when he became Assistant to the Manager of Publications. Since mid-1936 he has been in the Advertising Department of The New Jersey Zinc Company, New York City.

ACCOUNTING SECTION

Property Records and Continuous Inventory

by
O. H. Ritenour
Assistant Treasurer
Washington Gas Light Company
Washington, D. C.

Introduction

IN this paper, there is presented an outline of a property records system, including a continuous unit inventory, which has proven satisfactory in a gas company having approximately 170,000 active meters, and Fixed Capital totaling about $35,000,000. The company established this continuous unit inventory in 1935, using, as a basis, a complete physical inventory of all of its property which was prepared in connection with a valuation and rate case. The unit inventory constitutes a complete, continuous record of the company's fixed capital. It contains a description of each property unit as well as its cost. The inventory is operated as an accounting function rather than an engineering function. It is maintained in conjunction with job cost records, and is relatively simple and economical. It provides —in a compact, usable form—all information essential for current operations as well as for permanent history.

One of the outstanding features of this property records system is that it is so designed that all original papers supporting every entry in every job, account or inventory unit may be referred to directly, either currently or in years to come.

The advantages and benefits of maintaining adequate property records are not discussed in this paper, as it is assumed that, regardless of the requirements of regulatory authorities, the management of every public utility company must fully appreciate the value of clear, complete and indisputable property records.

The following is a general description of the system—

Flow Chart

The Flow Chart, shows the general order of procedure, and the principal forms.

Fixed Capital Budget

In November of each year we prepare a budget of necessary and desirable additions to, and retirements from, fixed capital for the following calendar year. The budget is classified as to principal items and is approved by certain officers of the company and by the board of directors.

Improvement and Retirement Requisitions

An Improvement Requisition (No. 1) is prepared for each Property Addition item and a Retirement Requisition is prepared for each Property Retirement item appearing in the budget. Requisitions set forth, among other things, the reason for the proposed property change, the benefits to be obtained therefrom, the approximate dates on which the work will be started and completed, and the estimated cost. Requisitions are classified as follows:

1. Requisitions covering specific projects.
2. Blanket Requisitions.

Those in the first group cover relatively large additions of a non-routine nature. Blanket Requisitions cover such items as meters, meter installation, services, mains, overheads, etc., and are divided into two groups, namely—

(A) Those covering classes of property additions for which costs are recorded by months and accounts only, such as services, meters, meter installation and overheads.

(B) Those covering classes of property for which a detail job cost compilation is prepared for each project, such as, structures, plan equipment, mains, transportation equipment, office equipment, etc.

Requisitions falling within the latter group specify the amount authorized for additions or retirements during the full year for each class of property, but, as they are of a general nature, they do not include specific descriptions of proposed changes. Therefore, before proceeding with any property changes covered by these general authorizations, it is necessary to submit, for approval, specific estimates, drawings, etc., for each project involved.

The procedure and illustrations discussed herein are based on the last named class of Requisitions as they are most representative of the system.

Job Records

Rider to Improvement Requisition (No. 2)

As explained in the preceding section, additional approval is required before proceeding with the property changes covered by Blanket Requisitions in group (B). Throughout the year, as occasion arises for making such property changes, a "Rider" to the proper requisition is prepared and submitted for the approval of certain officers, prior to the beginning of the work. The Rider includes a description of the project, the reason therefor, the benefits to be derived therefrom, the period during which the work is to be done and the estimated cost thereof. Space is provided on the back of the Rider for listing the major items of material required and other elements of cost. Space is also provided for showing the unexpended or unappropriated balance of the original budget authorization, the account classification and the reason for any overrun or underrun in excess of an allowed variation from the estimate.

Working Drawings

At the time a Rider is presented for approval, a working drawing or map of the proposed property addition is submitted. Working drawings include as much essential detail as is reasonably obtainable. A copy of the drawing is attached to each Rider and a copy is given to the foreman in charge of the job. The accounting department retains its copy of the working drawing until the job is completed, at which time a final drawing is substituted therefor, the

Presented before Accounting Section at A.G.A. Convention, Atlantic City, N. J., Oct. 13, 1938. Note—Space does not permit us to reproduce all of the forms here referred to.

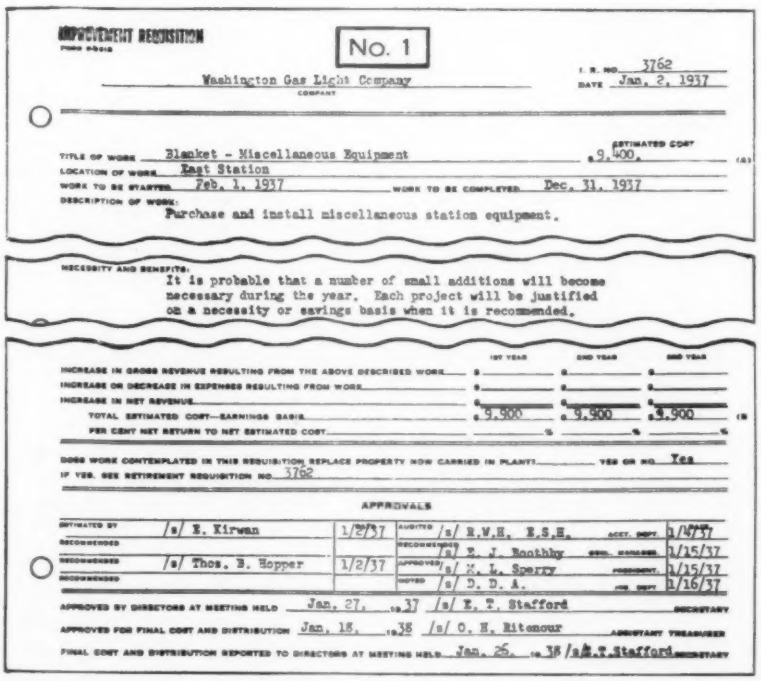
latter being filed as a part of the permanent record.

Job Ledgers

The accounting department opens a Job Ledger Sheet (No. 3) from the information shown on the original copy of the Rider. Costs are posted to this record in sufficient detail to permit the determination of the cost of each unit of property included in the job.

Direct Charges

All of the data required for posting direct job costs are audited and summarized in the accounting department. Punched cards are used in this work and a large percentage of the summaries and detail required for maintaining property records is tabulated from cards prepared for other accounting functions, such as payroll production, stores stock records, transportation costs, accounts payable distribution, journal entry summaries, etc. The procedure is briefly described as follows:



IMPROVEMENT REQUISITION No. 1

Washington Gas Light Company — I. R. NO. 3762 — DATE Jan. 2, 1937

TITLE OF WORK: Blanket - Miscellaneous Equipment — ESTIMATED COST $9,400.

LOCATION OF WORK: East Station

WORK TO BE STARTED: Feb. 1, 1937 — WORK TO BE COMPLETED: Dec. 31, 1937

DESCRIPTION OF WORK: Purchase and install miscellaneous station equipment.

NECESSITY AND BENEFITS: It is probable that a number of small additions will become necessary during the year. Each project will be justified on a necessity or savings basis when it is recommended.

	1ST YEAR	2ND YEAR	3RD YEAR
INCREASE IN GROSS REVENUE RESULTING FROM THE ABOVE DESCRIBED WORK	$	$	$
INCREASE OR DECREASE IN EXPENSES RESULTING FROM WORK	$	$	$
INCREASE IN NET REVENUE	$	$	$
TOTAL ESTIMATED COST—EARNINGS BASIS	$ 9,400	$ 9,400	$ 9,400
PER CENT NET RETURN TO NET ESTIMATED COST	%	%	%

DOES WORK CONTEMPLATED IN THIS REQUISITION REPLACE PROPERTY NOW CARRIED IN PLANT? YES OR NO: Yes

IF YES, SEE RETIREMENT REQUISITION NO. 3782

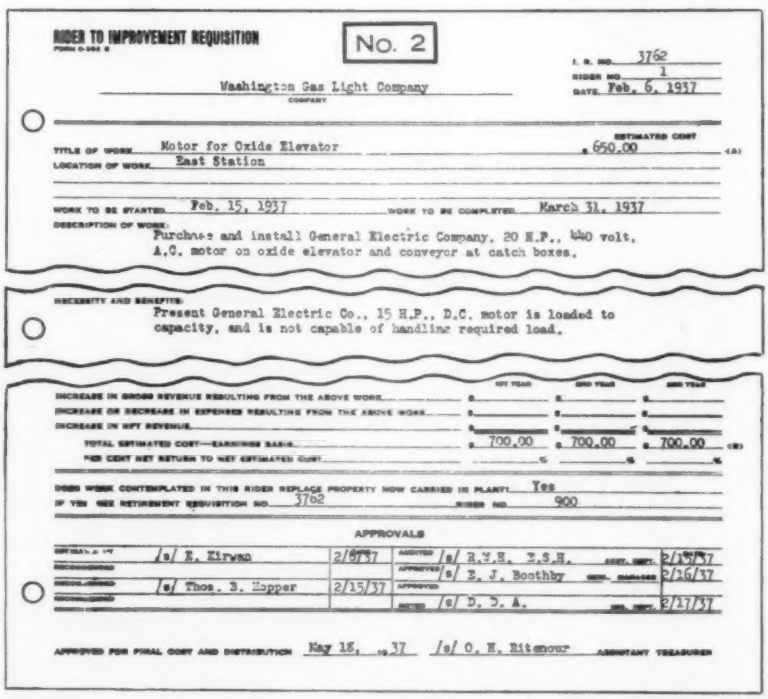
APPROVALS

ESTIMATED BY	/s/ E. Kirwan	1/2/37	AUDITED	/s/ R.W.H. E.S.H.	1/4/37
RECOMMENDED			RECOMMENDED	/s/ E. J. Boothby	1/15/37
RECOMMENDED	/s/ Thos. B. Hopper	1/2/37	APPROVED	/s/ W. L. Sperry	1/15/37
RECOMMENDED			NOTED	/s/ D. D. A.	1/16/37

APPROVED BY DIRECTORS AT MEETING HELD Jan. 27, 1937 /s/ E. T. Stafford SECRETARY

APPROVED FOR FINAL COST AND DISTRIBUTION Jan. 18, 1938 /s/ O. H. Ritemour ASSISTANT TREASURER

FINAL COST AND DISTRIBUTION REPORTED TO DIRECTORS AT MEETING HELD Jan. 26, 1938 /s/ E. T. Stafford SECRETARY



RIDER TO IMPROVEMENT REQUISITION No. 2

Washington Gas Light Company — I. R. NO. 3762 — RIDER NO. 1 — DATE Feb. 6, 1937

TITLE OF WORK: Motor for Oxide Elevator — ESTIMATED COST $650.00

LOCATION OF WORK: East Station

WORK TO BE STARTED: Feb. 15, 1937 — WORK TO BE COMPLETED: March 31, 1937

DESCRIPTION OF WORK: Purchase and install General Electric Company, 20 H.P., 440 volt, A.C. motor on oxide elevator and conveyor at catch boxes.

NECESSITY AND BENEFITS: Present General Electric Co., 15 H.P., D.C. motor is loaded to capacity, and is not capable of handling required load.

	1ST YEAR	2ND YEAR	3RD YEAR
INCREASE IN GROSS REVENUE RESULTING FROM THE ABOVE WORK	$	$	$
INCREASE OR DECREASE IN EXPENSES RESULTING FROM THE ABOVE WORK	$	$	$
INCREASE IN NET REVENUE	$	$	$
TOTAL ESTIMATED COST—EARNINGS BASIS	$ 700.00	$ 700.00	$ 700.00
PER CENT NET RETURN TO NET ESTIMATED COST	%	%	%

DOES WORK CONTEMPLATED IN THIS RIDER REPLACE PROPERTY NOW CARRIED IN PLANT? Yes

IF YES SEE RETIREMENT REQUISITION NO. 3762 RIDER NO. 900

APPROVALS

ESTIMATED BY	/s/ E. Kirwan	2/6/37	AUDITED	/s/ R.W.H. E.S.H.	2/15/37
RECOMMENDED			APPROVED	/s/ E. J. Boothby	2/16/37
RECOMMENDED	/s/ Thos. B. Hopper	2/15/37	APPROVED		
RECOMMENDED			NOTED	/s/ D. D. A.	2/17/37

APPROVED FOR FINAL COST AND DISTRIBUTION May 16, 1937 /s/ O. H. Ritemour ASSISTANT TREASURER

Labor

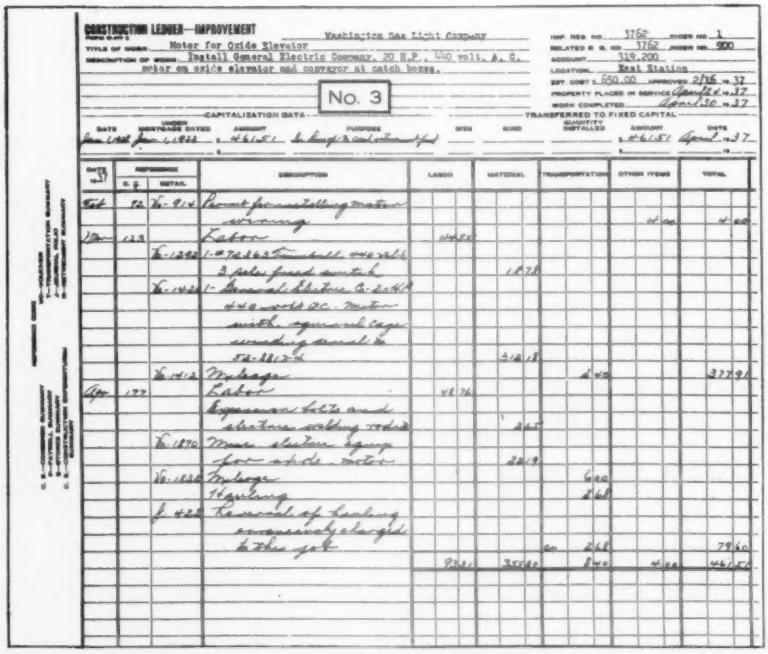
Time keepers, or foremen, enter on Time Reports (No. 4) the number of hours worked by each man on each job, the number of the account to be charged and a brief description of the work done. (The description must be sufficiently clear to enable auditors to determine the accuracy of the account classification.) Time Reports are signed by a foreman, checked by a time keeper, and approved by the department head. All time reports are sent to the accounting department on the day following the close of the period covered. An auditor examines each report, giving special attention to description of work. Auditors are supplied with copies of Riders to facilitate auditing.

Tabulating Cards (No. 5) are punched, from audited time reports, showing date, account number, man number, hours, etc. These cards are mechanically priced by the multiplying punch, and used in producing payrolls, payroll checks, Social Security Reports, etc. At the end of each month, the same cards, covering salaries and wages for the month, are mechanically sorted into order by the accounts to which the labor is to be charged, and a Payroll Summary (No. 6) is prepared on the tabulator. The tabulator is controlled by the account number, etc., punched in the card and, as the total amount charged to each account or job is printed, a Summary Card (No. 7) showing the account number, job number, amount of charge and certain other information, is automatically produced by the gang summary punch. These summary cards are sorted with similar summary cards for other classes of charges, i.e., material, voucher, transportation, journal, etc., and a Combined Summary (No 16) is printed on the tabulator. The combined summary is used in posting the Job Cost Ledger (No. 3.)

Time reports are filed permanently by date, department and man number, and, in auditing, may be quickly located simply by referring to the Payroll Summary (No. 6). As the time reports include a description of the work done, as recorded in the field, they constitute a very complete original record of labor charges.

Material from Stores

Stores Requisitions (No. 8) are prepared by the job foreman and approved by the engineer in charge



CONSTRUCTION LEDGER—IMPROVEMENT

Washington Gas Light Company

TITLE OF WORK: Motor for Oxide Elevator

DESCRIPTION OF WORK: Install General Electric Company, 20 H.P., 440 volt, A. C. motor on oxide elevator and conveyor at catch house.

No. 3

CAPITALIZATION DATA

TRANSFERRED TO FIXED CAPITAL

DATE	VOUCHER	AMOUNT	PURPOSE	UNIT	KIND	QUANTITY INSTALLED	AMOUNT	DATE
June 1938	June 1938	$461.51	Labor & Material				$461.51	April 30 '39

DATE	REFERENCE C. P.	REFERENCE DETAIL	DESCRIPTION	LABOR	MATERIAL	TRANSPORTATION	OTHER ITEMS	TOTAL
Oct	74	V-914	Permit for installing motor wiring				4 00	4 00
Dec	123		Labor	44 51				
		V-1242	1-10 H.P. Fairbanks-Morse 440 volt 3 pole fused switch		18 75			
		V-1421	1-General Electric C. 204 H 440 volt AC. Motor with squirrel cage winding and 52-18-24		312 18			
		V-1412	Mileage			2 40		327 93
Apr	177		Labor	41 76				
			Expense bills and electric wiring material		2 45			
		V-1870	Misc. electric supply for oxide motor		22 19			
		V-1838	Mileage			6 00		
			Hauling			2 60		
		J-422	Removal of leaking commercially charged to this job					79 60
				93 31	355 60	8 40	4 00	461 53

of the work. They show the number of the account and job to be charged as well as a brief statement of the purpose for which the material is to be used. These requisitions are serially numbered and coded in the storerooms, and forwarded to the accounting department on the day following that on which the material was issued. Stores requisitions are audited in practically the same manner as time reports. Tabulating Cards (No. 5) are punched therefrom, mechanically priced by the multiplying punch, and used, first, in stock control records, and, at the end of the month, in preparing a Stores Material Summary (No. 9). The stores material summary is practically the same as the payroll summary, described above, the only difference being that it shows stores requisition number and code number of material issued instead of man number, date, etc. The summary also shows the stores handling charges applicable to the material issued. Handling charges are calculated mechanically by the multiplying punch. The tabulating machine automatically produces a Summary Card (No. 7), in connection with the stores material summary, which is included in the Combined Summary (No. 16) with charges for labor, vouchers, etc.

Stores requisitions are filed in binders by month, account, and stores requisition number and may be referred to readily through the use of the Stores Material Summary (No. 9).

Voucher Charges

Tabulating Cards (No. 5) are punched for all Invoices (No. 10) and an Accounts Payable Summary (No. 11) prepared for each month. This summary is similar to the summaries of stores, labor, transportation, etc., previously described, in that it shows the total charge to each account or job and a detailed reference to the supporting records. Vouchers are filed numerically.

Transportation Costs

A Daily Time Card (No. 12) is submitted for each automobile or truck. This card shows the number of the car or truck, number of hours, a brief description of the work on which the equipment was used and the number of the account and job to which the time is to be charged. These reports go through practically the same routine as labor reports. The Tabulating Cards (No. 5) punched from these reports are mechanically priced by the multiplying punch and, at the end of the month, they are mechanically sorted into account order and a Transportation Summary (No. 13) prepared on the tabulator. In listing this summary the tabulating machine automatically produces a Summary Card (No. 7) for each account for inclusion in the Combined Summary (No. 16), for the month.

Transportation reports are filed by date and car number. They may be referred to through the use of the Transportation Summary (No. 13).

Charges for Use of Construction Equipment

The use of construction equipment, such as trenching machines, air compressors and back fillers, is reported and recorded in practically the same manner as the use of transportation equipment.

Charges Through Journal Entry

All Journal Entries (No. 14) are cleared through the tabulating section for the preparation of a monthly Journal Summary (No. 15), and the inclusion of account totals in the Combined Summary (No. 16). The journal summary shows the amount of the debit or credit to each account and a reference to the journal folio. All journal entries are referenced to supporting detail which is permanently filed.

Indirect Charges

Overhead Accounts

Charges are made to the overhead accounts, numbers 351 to 356 inclusive, as specified in the 1922 classification of accounts. "Taxes During Construction" includes, among other things, the portion of Social Security taxes related to salaries and wages charged to fixed capital. "Miscellaneous Construction Expenditures" includes a portion of the company's administrative and general office salaries and general office supplies and expenses.

Individual job cost records do not include overhead charges. All overhead items recorded in Accounts 351 to 356, inclusive, remain in those accounts until the property to which they are related is retired. To insure proper retirement of these items, we prepare an annual cost schedule which shows the relation of overhead charges to direct charges, by classes of property. These schedules are used in pricing retirements. This method produces the same result as would be arrived at if overhead charges were apportioned to specific jobs, but is less costly, and, in general much more satisfactory.

Posting Job Ledgers

Job ledgers are posted monthly from information shown in the Combined Summary. Labor, transportation and construction equipment charges are posted in total. All charges for material are reviewed and the more important items described, supporting papers being referred to for necessary descriptions.

As a rule, the job ledger is not posted until after monthly reports are released. This is practicable because all data needed for all reports are mechanically accumulated and summarized in the various forms required (not illustrated) by the accounting machines.

Property in Service Report

When newly constructed or acquired property is ready for use, a report known as "Property in Service Report" (No. 17) is forwarded to the accounting department. The date placed in service, as shown by this report is posted in the job cost ledger and the accrual of "Interest During Construction" discontinued.

Completion Report

Upon the completion of a job, a preliminary Completion Report (No. 18) is forwarded to the accounting department. This report shows the date on which the project was completed, a final description of the work done and a list of the major units or quantities of property installed. This notice is held in the accounting department until final charges are recorded, (usually until the end of the following month) at which time it is audited, a summary of the cost of the job is entered thereon and the report is returned to the construction department for certification. The report is certified by both the Construction Engineer and the General Superintendent, the certification relating to both the physical property and the cost thereof. The certified completion report is returned to the accounting department where it is approved by the officer in charge of property records and filed with other papers pertaining to the job.

Transfer of Costs from Work in Progress to Classified Accounts

When the certified Completion Report is received from the construction department the cost of the job is transferred from "Work in Progress" to the proper fixed capital account.

Fixed Capital Summary Ledger

The Fixed Capital Summary Ledger (No. 19) comprises a summary record of all completed fixed capital. It contains a separate sheet for each fixed capital account for each location or area. These sheets show the balance in each account as of the end of each month, also all additions and retirements, by jobs.

Final Drawings

As stated before, a drawing of each construction project is submitted with the Rider covering the proposed property change. The original drawings are prepared as completely as feasible, but, as the work progresses, more information frequently becomes available. Therefore, when the job is completed, all additional information is incorporated with the original information and a revised drawing prepared. A copy of the final drawing is sent to the accounting department where it is substituted for the original drawing and becomes a part of the permanent record.

A complete set of maps of both plant and distribution properties is kept current by posting thereon the data shown on final job drawings. When property changes are recorded on these maps they are properly referenced to job cost records.

Work in Progress and Budget Control

An effective Work in Progress and Budget Control System is operated, largely through the use of tabulating machine summaries (not illustrated) produced from cards prepared for other accounting operations.

FIXED CAPITAL INVENTORY

Washington Gas Light Company

ITEM OF PROPERTY Link-Belt Bucket Elevator — Inside Purifier Guide Handling Equipment — No. 20 — ACCOUNT NO. 310.200 — LOCATION East Station

DATE	REFERENCE	IDENTIFICATION RECORDED	DESCRIPTION	AMOUNT ADDITION	AMOUNT RETIREMENT	BALANCE
As of 6/30-1935	6/1/36 J. folio 5883; Stone & Webster Engr. Corp. Appraisal 6/30/32 Val. Exh. 51; Books #101 p.2346; #121 p.1999; #2 p.1823		Link-Belt vertical, centrifugal discharge, belt bucket elevator, 38'-8 3/4" centers, steel casing 7" x 12" W.I. Style A buckets spaced 20". No. 5c Boot, pinion chain drive with tightener and guard, No. 10 gauge steel receiving hopper 6' x 8' with steel grating and 3/16" floor plate, belt 14" wide, casing 4'-6" x 3'-10".			
			14" extra heavy screw conveyor 108'-6" long in 5/16" steel trough 110'-6" long, 8 rack and pinion gates with supports 10'-6" high complete with bearings, shafts, etc. Furnished by Link-Belt Co. with bucket elevator.	4 497 00		
			Motor for bucket elevator, G.E. Co., 15 H.P., 1,150 r.p.m., D. C. motor, compound wound, 115 volt, model No. 7H117, type K.C. 49, form A 10 No. 1945044. No. pulley or slide rails	250 00		
			General Electric Hand operated starter Cat. 764254A1	11 00		
			Power circuit and equipment	254 00		
			Foundation and pit	132 00		
			Restatement Balance as of 6/30/35			4,144 00
4/37	I.R.3762-R 1		G.E. Co., 20 H.P., 440 volt, 3 phase A.C. motor, serial #52-88124, with squirrel cage winding - type K.B. Used on oxide elevator and conveyor	461 51		
4/37	R.R.3762-R 900		G.E. Co., 15 H.P., compound wound D.C. motor - type K.C. 49		250 00	4,355 51

Although we are now using, in 20) record in 1935, starting with a physical inventory of its properties which was prepared in connection with a valuation and rate case. As the supporting detail for that physical inventory was not complete in any of the company's records, practically the full description of each unit, as prepared at the time of the physical inventory, was transcribed to the new inventory record. All additions and retirements made subsequent to the valuation date are completely detailed on job cost records and supporting papers, therefore, the inventory record of that property is much more condensed.

As previously stated, this inventory is designed along simple lines, It is, in fact, only a summary of job costs, but provides a continuous, clear record of both quantities and costs of property units.

A separate inventory record is maintained for each unit or class of property. At the time the cost of a completed job (addition or retirement) is transferred from Work in Progress to Classified Fixed Capital Accounts, a brief description of the property, with the cost, date and job number, is entered in the Fixed Capital Inventory record. When an addition constitutes a complete new unit, a new inventory sheet is opened. When a change is made in an existing inventory unit, a brief description of the property installed or retired is added to the proper inventory record and the value of the unit revised.

general, the list of retirement units recently prepared by the Committee on Statistics and Accounts of Public Utilities Companies of the National Association of Railroad and Utilities Commissioners, in making retirements, we do not record the cost of some classes of property in such small units. Our plan provides for recording distribution system property in very small cost units, whereas such property as structures and production plant equipment are classified only by major items. For the latter class of property, costs are sufficiently detailed to permit pricing of reasonably small component parts

FIXED CAPITAL INVENTORY

Washington Gas Light Company

No. 20

ITEM OF PROPERTY Link-Belt Bucket Elevator — Inside Purifier Guide Handling Equipment — ACCOUNT NO. 310.200 — LOCATION East Station

DATE	REFERENCE	IDENTIFICATION RECORDED	DESCRIPTION	AMOUNT ADDITION	AMOUNT RETIREMENT	BALANCE
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			14" extra heavy screw conveyor 108'-6" long in 5/16" steel trough 110'-6" long, 8 rack and pinion gates with supports 10'-6" high complete with bearings, shafts, etc. Furnished by Link-Belt Co. with bucket elevator.	4 497 00		
			Motor for bucket elevator, G.E. Co., 15 H.P., 1,150 r.p.m., D. C. motor, compound wound, 115 volt, model No. 7H117, type K.C. 49, form A 10 No. 1945044. No. pulley or slide rails	250 00		
			General Electric Hand operated starter Cat. 764254A1	11 00		
			Power circuit and equipment	254 00		
			Foundation and pit	132 00		
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4/37	R.R.3762-R 900		G.E. Co., 15 H.P., compound wound D.C. motor - type K.C. 49		250 00	4,355 51

thereof in case of a partial retirement. In other words, we include in certain original cost units a number of items which may be priced and treated as individual units for retirement purposes. Under this procedure it is unnecessary to compile and individually record the cost of numerous miscellaneous small items, component parts, etc., unless and until such information is actually required for pricing retirements. This greatly simplifies the system, makes the operation relatively economical and, we believe, is in accordance with the practice the N.A.R.U.C. had in mind when the new classification and list of retirement units were approved.

Filing

Reports of Labor, Transportation, Construction Equipment, Stores Material and Journal items are filed in permanent binders, by months in precisely the same order as the information they contain is listed in the detailed tabulating machine summaries. Vouchers are filed numerically. All summaries, which are prepared strictly in account number order and are very compact, are also bound and filed permanently, by months. Punched cards are not retained. Riders, Completion Reports and Drawings are filed together in job number order.

Auditing

Direct reference to all original records is shown on monthly summaries.

Accounting Machines

Through the use of punched cards we mechanically compile very detailed cost analyses and condense the related elements of these analyses into clear, compact cost summaries. Thus we greatly minimize manual work, expedite the production of reports, and, *most important*, obtain final results which are directly and completely referenced to original records.

Conclusion

The simplicity, and economy of operation, of this fixed capital unit inventory is made possible by our method of preparing, summarizing and preserving all original cost data; and because it is operated in conjunction with job cost records, thus eliminating the duplication of voluminous details. It has been proven adequate and satisfactory.

Report of Customer Accounting Committee

John A. Williams, Chairman

Pet Procedures

Subcommittee—Customer Accounting Committee
W. R. Seidel, Chairman

Rochester Gas & Electric Corp., Rochester, N. Y.

PRACTICALLY every gas company accounting official has some one procedure in his customer accounting department of which he is particularly proud, some one procedure that he thinks is better than anyone else has for a similar job. Your committee felt that it should be helpful to all of us if we could assemble some of these so called "Pet Procedures" for the information of the industry.

We, therefore, wrote to a number of individuals and companies asking for write-ups of their outstanding procedures, placing no limitation on the kind of subject.

From the variety of replies that came in, we made a selection of seventeen procedures for inclusion in this report and feel that each one contains some thought or idea that can be profitably applied in many accounting systems.

Presented before Accounting Section at A.G.A. Convention, Atlantic City, N. J. Oct. 13, 1938.

SUMMARIES

1. *Proving and Posting of Cash by Routes Daily*

A procedure describing the receipt and preparation of mail payments, the presorting and listing of coupons, and balancing of tellers' cash; also the posting by unit posting clerks having individual adding machines to furnish listings and control totals to agree in summary with Cashiers' Daily Report.

2. *Method of Sorting Cash Stubs and Posting Cash*

A description of the methods in use by a large company to complete the sorting of cash stubs before the 5 P.M. closing, and the posting of that cash to the accounts before 11 A.M. the following day. Metal sorting trays are furnished with removable pockets that control the movement of stubs in balancing units from the cashiers to the posting clerks. Postings are made to office record stubs that are removed, and totaled for balancing with the cashier's control and ledger control entry.

3. *Cumulative Totals of Daily Cash Eliminate Detailed Cash Controls*

This report describes a company's method of carrying forward each day the cumulative totals of cash received by meter book controls. Cashiers make preliminary sort and furnish sub-totals for the controlling units. A cash analysis form is shown to illustrate plan of breakdown, also a tabulation of a route book control at time of cycle balance. Although used primarily in connection with controls on tabulating equipment it is also applied to a control on the stub accounting plan.

4 *Billing Budget Househeating on Missed Readings*

A plan of billing only the budget amount on a househeating account and releasing the bill with a sticker attached announcing inability to obtain readings and advising that bill for regular service and househeating statement will be rendered in a few days. Another addressed bill and a statement form are sent to the Billing Department and prepared for re-

Yes • • • BARBER *has added* Round Burner "Flexibility" *to its Many Improvements!*

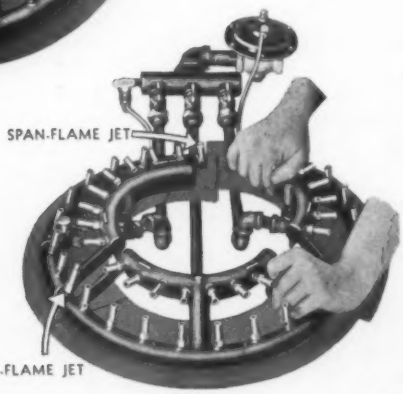
As usual, BARBER BURNER is out in front with a new feature in *round burner* design which will be instantly appreciated by heating dealers and gas experts. It's the Barber "expansion principle"—which enables round conversion burner assemblies to be quickly and properly adjusted, at time of installation, to the grate diameter of the furnace or boiler. *It means that you can carry a smaller stock.*

(Above) burner set at smallest diameter, ready for installation in boiler.

•

(Right) installer swings the 2 units, connected to outer control lines, outward to required diameter.

•

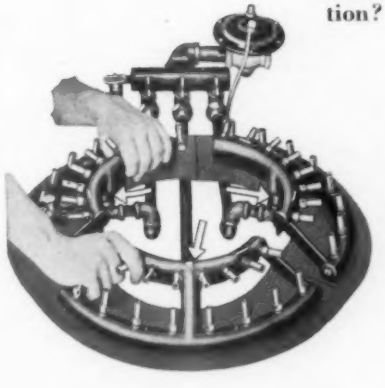


For example, as shown in the illustrations of No. 324 Burner, this model has a range of adjustment for combustion chamber diameters of 18″ to 20½″. All Barber Round Conversion Burners are now furnished with this adjustment feature, and can be contracted or expanded to dimensions shown in Barber Catalog.

This betterment, exclusive with Barber, applies a new significance to the idea of "tailor-made" gas conversion burners—since the furnace can now be *accurately* fitted with the proper unit for efficient heating. It's a sure thing there will now be many more furnaces and boilers converted to GAS—and many new dealers and distributors converted to Barber Burners! Why not write today for full information?

(Right) burner assembly spread to maximum diameter. Short nipples are furnished for boilers, longer nipples for furnaces.

•



Baffle plates are easily trimmed to fit. No refractories needed.

Round Burner models come in 8 sizes for grates 12″ to 34″ in diameter. There is also a wide range of sizes for oblong grates. Patented BARBER Jets insure complete combustion, with a "scrubbing" flame action on walls of firebox. Baltimore Safety Pilot. Listed in A. G. A. Directory of Approved Appliances. Ask for Catalog and Price List on Conversion Burners for Furnaces and Boilers, Burner Units for Gas Appliances, and Gas Pressure Regulators. We supply sales folders, at your request, for mailing to your customers.

THE BARBER GAS BURNER CO., 3704 Superior Ave., Cleveland, Ohio

Address Michigan Inquiries to The Barber Gas Burner Co. of Michigan, 4475 Cass Ave., Detroit

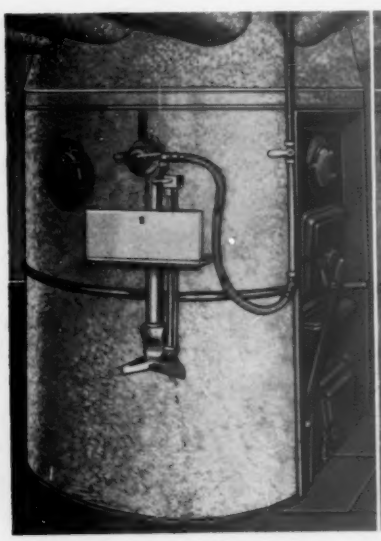
BARBER *Automatic* JET GAS BURNERS

Like many, many others, she is ready for automatic Spring-Fall heating.

Secure this business for gas with the H-B Spring-Fall Burner.

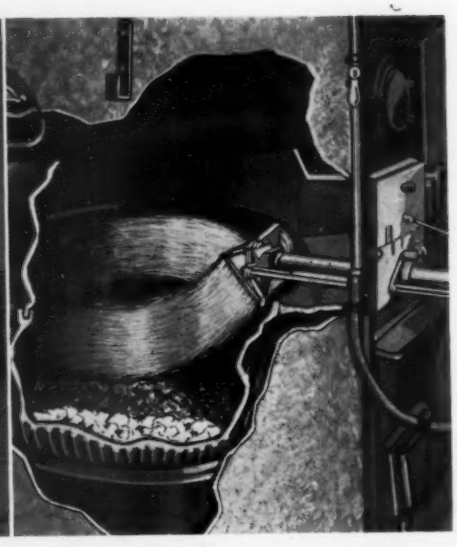
Many of your customers are anxious for relief from the bother of tending fire during the chilly Spring and Fall days when a steady solid fuel fire gives too much uncontrolled heat or keeps going out and has to be rebuilt.

You can supply this need in a manner satisfactory to your customers and at a profit to your company by selling the H-B in-A-Door-Spring-Fall Burner.



Hangs on side of heating plant when solid fuel is being used.

Easy to place in operation in furnace or boilers.



The heat is applied low in the firepot, giving combustion efficiencies comparable to gas designed equipment.

FOR FURTHER DETAILS WRITE

HANDLEY-BROWN HEATER CO.

JACKSON, MICHIGAN

lease upon obtaining readings from the missing index records (late billing).

5. *Accounting for Gas Meters in Service*

A system of centralizing the service records of over 700,000 meters and accounting for the orders of twenty-four commercial offices that affect the status of meters in customers' premises. This count of meters in service is maintained through the entry of these orders to Meter Book Unit Controls. In conjunction with the billing operation, the Tabulating Division reviews the month's work on the Unit Controls and the corresponding meter books; also checking the quantity of meters as reported through the Sales Analysis of each meter book with the total figures established on the Unit Controls.

6. *Building and Maintaining a Gas Meter Inventory Record*

An article that presents the details of setting up and maintaining a complete gas meter inventory record on Tabulating Cards. Cards were addressographed and meter numbers punched from the meter books, then sorted into numerical sequence to obtain the additional data required from the original shop cards. The new record is maintained by working set and remove orders against the file and moving cards from one file to another in exact reflection of the movement of the meters between the shop and customers' premises. System provides for monthly check of sets and removes and although carried in numerical sequence, is also tied in directly with billing through the route and folio identification.

7. *Balancing Meters*

A comprehensive system for control of the number of meters on customers' premises through the daily accounting of meter set and removal orders. An accurate balance is maintained with the monthly billing at cycle and cycle balances are reconciled to reflect meters in service at the close of each calendar month. This method is used by a company serving approximately 95,000 gas customers through 18 district office controls, and no part of it employs the use of tabulating machinery.

8. *Delinquent Ledger on "Keysort Cards"*

A method of placing delinquent records on prepunched slotted cards and making the selection for write-off through a "needling" operation. Before filling new accounts the cards of that same month, previous year, are needled out and the amount still outstanding run off by adding machine for the write-off to Profit and Loss.

9. *One Form—One Writing for Customers' Service Requests*

A system of service order preparation involving a single set of forms applicable to all types of service requests which eliminate errors in transcription. A single form is written up with "Ditto" pencil from which the desired duplicate copies are made, the selection of forms for distribution being governed by the nature of the request. Use is made of one original and required forms. Forms are illustrated.

10. *Elimination of Final Billing Through Transfer from One Address to Another*

A procedure designed to transfer final consumption at one address to a customer's account at a new address to be added to and billed with the first consumption at the new location. Under this method a customer should seldom receive more than one bill during a 30 day period. A transfer form has been designed to pick up the final consumption, unpaid gas, and appliance amounts for transmittal to the clerk handling accounts at the new location where the items are set up in the new ledger account and added to the first bill.

11. *Transfer of Final Meter Readings*

A brief discussion of transfer routine from the preparation and cross-indexing of meter orders to the meter book entries for combining last and first consumptions. Through the use of transfer coupons on arrears and this combining of consumptions on the first bill at the new address, it should not be necessary to release a final bill to customers moving within the same operating district.

12. *Installment Billing by Addressograph*

A special addressograph file is maintained for merchandise accounts with the monthly installment amount embossed on the plate. A three-part bill is addressographed, checked with the ledger for inclusion of arrears, and attached to the gas bill for delivery. The third stub portion remains with the gas account stub, and is destroyed when paid, or checked with the ledger account and turned over to the collection group.

13. *An All Purpose Sales Order for Merchandise Accounting*

There is here described a three copy sales order and heavy paper jacket consisting of sales agreement, stores order delivery receipt, receipt for down payment, cash posting stub and the jacket comprising the ledger record. After orders are completed the number 1 copy of the sales order is clipped to the jacket on the lower portion of which is the ledger record. The signed agreement becomes an integral part of the ledger and errors through the usual transcription from sales order to ledger are avoided.

14. *Merchandise Collection — Follow-up*

A brief outline of the follow-up on merchandise accounts through use of a collection report card illustrated as form No. 11.

Cards are set up on first delinquency and retained in a follow-up file for future checking with the ledgers until the account is paid in full.

15. *Maintaining Accounting Records for Financed or Guaranteed Minimum Extensions and the Installation of Stub or Curb Service*

This report is fully illustrated with card forms (12-18) on which entries have been made to show the details of control. Through the tie-in of the meter book folio numbers, billing information is easily gathered for refunding either percentage credits on the basis of use or as additional customers are attached to the lines.

16. *Combination Application and Credit Cards*

A new card form No. 21 recently designed to combine the information that was formerly carried on separate cards in two different files. Applications are taken on one side of the card and the other side used for addressograph imprint, credit information, and collection purposes. Cards, are maintained in route and folio sequence, and on subsequent moves are either transferred or the pertinent information carried forward to the new card.

17. *Speeding Account Information to Customer Contact Groups*

Describes specially designed telephone facilities which in conjunction with an "Accounting Unit" plan of operation makes it possible for telephone service and personal contact clerks to secure account information in the simplest and speediest manner. This system permits of direct accessibility to account records, flexibility and speed of handling and the elimination of delay due to busy lines.

Report of Accounting Machines Committee

George W. Fuchs, Chairman
Philadelphia Electric Company
Philadelphia, Pa.

Applications of Accounting Machines to Payroll Accounting

Previous committees have ably entered the field of billing, stores accounting and merchandise accounting, stressing the uses made of accounting machines in this work. Your committee felt that this year provided an opportune time to compile data dealing with the application of accounting machines to payroll accounting. The Federal Social Security Act and the Unemployment Compensation Acts of many states have been in effect long enough to permit a reasonable degree of standardization in stationery forms and procedure. Many companies have probably continued the use of uneconomic, inadequate or worn out equipment pending the approach toward standardization. This report should prove of value to such companies who are now in the market for new equipment or who are considering changes in procedures but desire to continue the use of their present equipment augmented by minor equipment.

The committee earnestly tried to fairly explain the uses made of each manufacturer's equipment, but no attempt was made to compare their relative merits nor cost of operation. Any company interested in further pursuing this subject can do so by writing to the companies whose installations are described in the report. Naturally, in such a limited space, the committee could not exhaustively describe each installation, but sufficient detail has been retained, supplemented by exhibits to present a fair picture of the operation of each plan. Both large and small installations are described.

Following are tabulations showing statistical information of various companies. The first tabulations are for those companies whose installations have been described in this report. The second tabulation applies to other companies whose installations are not described in this report.

Presented before Accounting Section at A.G.A. Convention, Atlantic City, N. J., October 13, 1938.

TABULATED DATA OF ACCOUNTING MACHINE INSTALLATIONS AND PAY ROLL PROCEDURES DESCRIBED IN THIS REPORT

Name of Company	*Type of Accounting Machines*	*Types of Utility Service Rendered*	*Area Served*	*Number of Customers*	*Number of Employees*	*How Paid*
Consolidated Edison Company of New York, Inc.	International Business Machines	Gas and Electric	New York City	2,250,000	23,800	21,000 weekly in cash 2,800 monthly by check
The Peoples Gas Light and Coke Company	Underwood-Elliott-Fisher, Sundstrand	Gas	Chicago, Ill.	840,000	4,092	Semi-monthly by check
The Philadelphia Gas Works Company	Burroughs	Gas	Philadelphia, Pa.	460,000	2,500	Bi-weekly by check
New England Gas and Electric Company	Remington-Rand	Gas and Electric	New England	263,000	1,900	Weekly by check or draft
Northern Indiana Public Service Company	Underwood-Elliott-Fisher, Sundstrand	Gas and Electric	Northern Indiana	209,000	2,100	Semi-monthly by check
Washington Gas Light Company	International Business Machines	Gas	District of Columbia and parts of Maryland and Virginia	180,000	1,800	1,000 hourly employees weekly by check 800 salaried employees semi-monthly by check
The Peoples Natural Gas Company	Burroughs	Gas	Western Pennsylvania	150,000	1,893	Monthly by check
Kansas City Power and Light Company	Remington Rand-Dalton	Electric	Kansas City Missouri	142,000	2,029	Semi-monthly by check
The Dayton Power and Light Company	National Cash Register Company and Burroughs	Natural Gas and Electric	Miami Valley, Ohio	126,000	1,500	Weekly by check

TABULATED DATA OF COMPANIES NOT DESCRIBED IN THIS REPORT

Name of Company	*Type of Accounting Machines*	*Types of Utility Service Rendered*	*Area Served*	*Number of Customers*	*Number of Employees*	*How Paid*
Philadelphia Electric Company	International Business Machines	Electric in Philadelphia Gas and Electric in Suburbs	Philadelphia and Suburbs	826,633	7,208	Semi-monthly by check
Public Service Company of New Hampshire	Underwood-Elliott-Fisher, Sundstrand Machine	Gas and Electric	New Hampshire and parts of Vermont	77,662	1,100	Weekly by check
Central Indiana Gas Company	Burroughs	Gas	East Central Indiana	26,500	260	Semi-monthly by check

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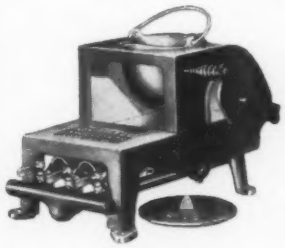

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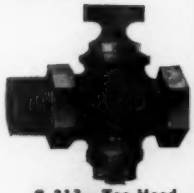
G-203—Tee Head Standard Gas Stop



G-213—Tee Head Standard Gas Stop Male and Female

The New and More Rigid Distinction Between Capital and Maintenance Expenditures and Its Effect on Depreciation Allowances for Income Tax Purposes

By
C. R. Luebke
The Peoples Gas Light and Coke Co., Chicago, Ill.

The Uniform Classification of Accounts recently prescribed by certain of the regulatory commissions, and which may be expected to be adopted by others in the near future, provides for a new and more rigid distinction between capital and maintenance expenditures. As a basis for such distinction, the Uniform Classification provides, in effect, for a fixed system of retirement unit accounting and, in connection therewith, defines and describes those items of property, termed "retirement units," which, upon replacement, are required to be accounted for through the plant accounts. Replacements of minor items of property, not constituting "retirement units," are permitted to be charged to the maintenance expense accounts.

The stated purposes of these provisions in the Uniform Classification of Accounts are "to create a greater uniformity in accounting for replacements of property," and to "also create a greater uniformity in depreciation accounting." True to the implication of that statement of purposes, it is recognized that the practices of the gas utilities, one compared with another, have, in the past, varied considerably with regard to accounting on their books for replacements of property and the providing of reserves for depreciation or the retirement of property. In connection with accounting for replacements of property, one company, for instance, may have followed the practice of charging to maintenance expense the cost of replacing a holder crown, while another company may have accounted for such a replacement by removing the value of the old crown from the property account, by a charge to the depreciation reserve, and charging the cost of the new crown to the property account. The latter method, of course, will now be required to be followed by all companies subject to the new Uniform Classification of Accounts. As to the accounting for reserves for depreciation or retirement of property, many different methods have been used. The Uniform Classification of Accounts does not require that a uniform method of depreciation accounting shall be used by all companies, but the provisions of the classification relating to accounting for replacements indicate that they are intended to contribute to the apparent objective of "a greater uniformity in depreciation accounting."

Maintenance expenses and provisions for depreciation as recorded on the books, may, in some instances, be allowed without adjustment as deductible expenses for income tax purposes. Often, however, maintenance expenses and provisions for depreciation as recorded on the books are required to be adjusted in order to conform to the income tax regulations or the rulings of the Bureau of Internal Revenue. Especially is this true with regard to allowances for depreciation. Whatever the case, it may be fairly presumed that the maintenance and depreciation allowances for income tax purposes satisfactorily conform to the pertinent provisions of the income tax regulations of which the following are of particular significance:

Article 23 (a)—4. Repairs

"The cost of incidental repairs which neither materially add to the value of the property nor appreciably prolong its life, but keep it in an ordinarily efficient operationg condition, may be deducted as expense, provided the plant or property account is not increased by the amount of such expenditures. . . . "

Article 23 (l)—5. Method of Computing Depreciation Allowance

"The capital sum to be recovered shall be charged off over the useful life of the property, either in equal annual installments or in accordance with any other recognized trade practice, such as an apportionment of the capital sum over units of production. . . . "

In a consideration of the effect of the new and more rigid distinction between capital and maintenance expenditures on depreciation allowances for income tax purposes, it is necessary to relate the prescribed changes in replacement accounting methods to the present basis and method of determining maintenance expenses and depreciation allowances for income tax purposes, whether that basis is in agreement with the book accounts, involve certain adjustments to the book accounts, or represents a complete departure from the method of accounting for maintenance and depreciation on the books.

Proper allowances for depreciation vary inversely with the charges to maintenance expense. If items of property of the type which were formerly replaced through maintenance are now replaced through the property accounts, the annual depreciation allowance will be increased because:

1. The capital sum to be recovered by way of depreciation has been increased, and

2. The years of average useful life of the property, over which the capital sum is to be apportioned by means of the depreciation provision, are decreased by reason of the shorter interval between the date of the addition of such items to the property account and the date of their removal therefrom.

On the other hand, if items of property of the type which were formerly replaced through the property accounts are now charged to maintenance, the annual depreciation allowance will be decreased because:

1. The capital sum to be recovered by way of depreciation has been decreased, and

2. The years of average useful life of the property, over which the capital sum is to be apportioned by means of the depreciation provision, will be increased by reason of the longer interval between the date of the addition of such items to the property account and the date of their removal therefrom.

Whether the annual maintenance charges be decreased and the depreciation allowance increased, or a contrary condition prevails from year to year, the combined total of maintenance and depreciation to be accounted for during the useful life of a property is limited to the net cost of the investment therein, plus the costs of replacements and repairs. The combined total of maintenance and depreciation is fixed; it is only the distribution of the charges to years or accounting periods that may be influenced by the new distinction

Abstract of paper presented before Accounting Section at A.G.A. Convention, Atlantic City, N. J., Oct. 11, 1938.

between maintenance and capital expenditures. Therefore, to the extent that maintenance and depreciation allowances are factors in the determination of net income subject to tax, the total thereof for all years during the useful life of a property will not be changed.

If the effect of the new distinction between maintenance and capital expenditures is such that maintenance is decreased and the depreciation allowance is increased, the combined total charge for maintenance and depreciation may be expected to be more uniform from year to year. Changes in economic and operating conditions, financial policies, and similar factors usually have a more or less immediate influence upon maintenance expenditures, but do not so readily bear upon the determination of the annual depreciation allowance. As the more variable element of maintenance is decreased, and the more stable element of depreciation increased, the more uniform from year to year becomes the combined total of both elements. If replacements formerly accounted for through the property accounts are now charged to maintenance, it follows that the peaks and valleys in the combined total of the maintenance expenses and depreciation allowances will become proportionately more pronounced. From at least one point of view, the latter condition may be considered to be more favorable for income tax purposes. Policies regarding maintenance are commonly influenced by the trend of gross revenues, expenditures therefor becoming more liberal when revenues are relatively high and being restricted or deferred when revenues are low. Thus, the annual taxable net income tends to become equalized as replacements of property are made through maintenance and to become subject to wider fluctuations when replacements are accounted for through the property accounts.

The Necessity of Training Supervisory Employees*

A. E. Hald
Chairman
Consolidated Edison Company of New York
New York, N. Y.

The modern trend of industrial psychology has brought a consciousness to all classes of workers, in all fields of industry, a growing sense of their personal rights in management and production. This psychology has resulted in a marked increase in emphasis upon the supervisor and his importance in industry. Suvervisors should know the history and trend of modern industry and the principles governing its development. They should know especially the conditions, the attitude of mind and the modern industrial methods that affect the human factor in industry. The supervisor, to most of those with whom they come in contact, is the company. Upon him rests the burden of interpreting and maintaining cordial and lasting industrial relations. It is no longer enough for a supervisor to be skilled in mechanics or the science of his profession—he must know the science of human relations. He must be able to judge the character of individuals, administer justice, explain policy, adjust grievances, develop men and maintain production. The rule of thumb method of dealing with employees is fast disappearing. The present day industrial trend has made it obsolete.

To meet such responsibilities, what manner of man ought the successful supervisor be? Recent surveys and analysis of supervisors show that three-fourths of their qualifications relate to their attitude toward those under their jurisdiction and one-fourth of their personal and technical skill. It is no longer enough that a supervisor be a producer of work—he must be a leader and guide to his men. His is the most influential contact with the employees, and the policy of the company as to the workers is, in the last analysis, no better and more effective than the supervisor through whom that policy reaches the men.

** Subcommittee of Office Management Committee, W. C. Terry, Chairman. Abstract of Report presented before Accounting Section at A.G.A. Convention, Atlantic City, N. J., Oct. 13, 1938.*

Prerequisites of Supervisory Training

The keynote to success in industrial relations today is not merely the training of the supervisory force in the science of humanics. To make such training effective, management must create a program as a prerequisite so that the training of those leaders can be demonstrated in a sincere and earnest way to those over whom they have jurisdiction. Without the whole-hearted cooperation of management, the finest demonstrations of supervisory training are foredoomed to failure and will be treated as "bunk," not only by the working force but by the supervisors themselves.

Even with an attitude well expressed in a company-policy statement, which should assure satisfactory mutual relations, success is not assured. The policy must be practiced in order to be acceptable. A company policy frequently succumbs to unintentional but constant erosion, on its way from top management to first line supervision. The forces for disintegration are numerous; the forces for fulfillment are weak. To insure the success of the policy there should be a continuous and visible demonstration of the company-attitude in the supervisor's daily contacts with the workers.

Types of Supervisory Training Programs

To assure the success of the supervisor's relations with his men, many industrial organizations have adopted programs of supervisory training. A program is like a tailor-made suit of clothes; it should be made to fit the needs and requirements of the company that adopts it. Programs that have proven their worth, all have as their objectives, no matter what their form, the principles of leading instead of bossing; teaching instead of showing; listening more, talking less; more frankness, less diplomacy; understanding instead of logic; trust in place of suspicion. It costs more to correct than to prevent. Advance discussion and agreement are the modern substitutes for arbitrary attitudes.

Of those organizations which have definitely set out on supervisory training programs the different types of programs may generally be classified as follows:

1. The Conference Method.
2. The Lecture Method.
3. The Circulation Method.
4. Instruction through outside Agencies.

The Conference Method

The entire objective of the conference method is to get the participants discussing their problems and arriving at sound logical solutions. This objective precludes the use of teachers or study material but does necessitate proper guidance.

The Lecture Method

Under this method lectures are combined with the study of text material and discussion. The lectures furnish background on such subjects as Business Economics, Psychology, Company Organization and History, Products and Markets, and Plant Policies and Practices. It has been found that when the lecture is combined with discussion the information is better understood and more readily absorbed by the supervisory group.

The Circulation Method

This method is an informal tvpe of supervisory training. It consists mainly in the distribution of letters from executives and other officials in the companies on topics of general interest to the company; or as in most cases where this method is used, the information distributed is purchased from outside agencies. In some cases the circulation method is extended to include outside speakers or picture shows. Under this method there is no personal contact as between the management and the supervisors in the development or the solution of the problems touched upon. There is no way to determine the reaction of the men who are supposed to receive the training, and further there is no way to measure the value of the effort being put forth.

Instruction through Outside Agencies

A number of universities and colleges offer special courses in supervision, both in the classroom and by correspondence. It has been found that such courses are particularly adapted to the use of organizations too small to consider a more elaborate company training program.

General

The question is sometimes asked as to which supervisory employees should receive supervisory training. A number of large organizations, who have had training programs in effect in the past, have found it advisable to extend such training to top rank executives as well as to first line supervisors. Under present-day conditions and thought, the proper answer to the question appears to be that all supervisory employees should receive this training. It has also been found, no matter what the method, that better results are obtained and more enthusiasm is evidenced when the training is conducted on company time rather than on the employee's personal time.

What a Successful Supervisor Should Be

A good and efficient supervisor is primarily a leader of men. He must possess the attributes of being an organizer, planner and teacher. He must also be a selector, rewarder and measurer of men. He must be a man of decision and a source of confidence, inspiration and power to his men. The extent to which he has or acquires these attributes will measure his success and will assist not only in producing prosperity and a greater measure of welfare to the organization but also to those employees over whom he has jurisdiction.

In surveys as to the causes of success or failure of supervisors it was revealed that three-fourths of the causes relate to the supervisors' personal attributes and one-fourth to technical or personal skill. Among the causes given were the following:

Successful Supervisors

Leadership
Ability to plan work
Ability to place men
Ability to cooperate
Pleasing personality
Thoughtful of his men
Self-confidence
Confidence in others
Gives credit for suggestions
Encourages initiative
Instructs men
Eager to learn
Ambitious
Pride in company
Good judgment
Practical
Firm character
Mechanical and technical ability
Loyal to superiors

Unsuccessful Supervisors

Low in leadership
Poor in placing men
Lacking in aggressiveness
Conceited
Criticises men openly before others
Criticises superiors before men
Criticises his men to management
Poor in planning work
Selfish
Rules through fear
Does not teach men new technical developments in regard to their work
Holds back information regarding work
Lacks self-control
Drinks with men and drinks too much
Treats men as labor
Envious
Excitable and irritable
Abusive
Abrupt

The above are among the qualities that win or lose. Supervisors should have the essentials of personal qualities brought to their attention in an emphatic way. Careful introspection and analysis may reveal to them many hindrances to their own advancement. Application of the qualities that win may bring to them some of the realizations of their ambitions.

Collection Routines

Subcommittee—Customer Accounting Committee

M. J. Coughlin, Chairman

The Hartford Gas Company, Hartford, Conn.

IN the collection of the delinquent gas service account, we find we are concerned with a group of customers, small as a rule compared to the total whom we serve, who from month to month fail to pay us within a specified time for the service we have rendered. The individuals comprising this group usually vary from month to month, the same names seldom appearing more than twice during a twelve month period, although a few appear regularly month after month, year after year.

We are naturally anxious to collect all of these delinquent accounts but our concern is, first, to do so with the least disturbance to the individual's good will, as we clearly are desirous of his continuing as a customer, and second, with the minimum additional expenditure, there being no justification for "throwing good money after bad."

We may hope to retain the good will of the majority of our delinquent customers, while effecting collection of their accounts, if we classify them according to their paying habits, adopt a procedure of moderation in dealing with the temporary delinquent and follow a policy of firmness with those habitually tardy.

If this be true, an ideal collection procedure would seem to be one

Presented before Accounting Section, A.G.A. Convention, Atlantic City, Oct. 13th, 1938.

which expends little, if any, money and effort on the delinquent customer who but occasionally falls from grace, but concentrates on the chronic offender.

A collection procedure which attempts to approach this ideal has been in operation in a company serving one-half million customers since 1934. It is based upon the proposition that collection activity is most effective, and most conducive to satisfactory public relations, when each customer is treated as nearly as possible in accordance with his own individual paying habits and credit standing. For that reason, customers are classified according to their past collection history, and a suitable procedure is established for each group.

Permanent Collection Work Order

A permanent collection work order is originated the first time a customer requires the call of a collector, and thereafter, this same work order is used for all subsequent gas collection activity. This work order is filed according to the customer's address, which address is changed when a customer moves, and it thus becomes a permanent collection history record. It shows the chronological record of collector's calls, the customer's classification, the amount of his deposit and miscellaneous remarks concerning his credit standing.

Classification of Customers

With the information appearing on the permanent work order as a basis, customers are classified as A, B, or C, and addressographed plates are symbolized to show this classification for class B and C customers only, together with a numeral which, when multiplied by five, indicates the amount of the customer's deposit with the company.

Classified Collection Procedure

Class A—Customers who pay at company offices, or remit payments, either upon receipt of a bill or a delinquent notice.

Collection procedure:

1. No action until second bill.
2. Second bill (i.e. first bill showing an arrearage) carries a polite delinquent notice sticker.
3. "Important Notice" is mailed two working days after the last day for payment of the current bill and warns of discontinuance of the service if payment is not made within four calendar days.
4. Collector calls on the second working day after the effective date of the "Important Notice."

Class B—Customers who pay regularly, but wait for the collector to call, i.e., customers who have required a collector's call more than twice in a year, but have not had more than one two-call bill in a year.

Collection procedure:

1. No action until second bill.
2. Stickers and mailed notices are omitted.
3. Collector calls on the third working day after the last day for payment, i.e., the day that Class A customers receive the "Important Notice." If collector is unable to effect collection or obtain a satisfactory agreement, he leaves a final notice effective three calendar days later (i.e., the effective date of the "Important Notice" mailed to Class A customers).
4. Collector calls again approximately five days after his first call (i.e., the date of the first call on Class A customers).

Class C—Customers who usually pay only after two or more calls by collectors, i.e., customers who have had more than one two-call bill in a year, also customers who have been shut off for non-payment, have made a practice of tendering bad checks, or have had an appliance repossessed for non-payment or charged off as uncollectible.

Collection procedure:

1. Action taken on first bill if it is more than $3.00. If bill is less than $3.00, a second bill is allowed to accrue before collection activity is begun.
2. In all other respects, collection procedure for this class of customers is like that prescribed for Class B.

Under this procedure, collectors do not discontinue the service where the deposit covers total bills plus one month's additional consumption. That is, no service will be discontinued where there is a $10.00 deposit and two months' bills total less than $7.00 or where there is a $5.00 deposit and two months' bills total less than $3.00.

Additional papers and reports presented before the Accounting Section were as follows:

Customer Relations Committee Report, Blackwell Newhall, *Chairman*, with panel discussion on the subject of "Team Work and Customer Relations — What Are We Doing About It?"

Uniform Classification of Accounts Committee, Depreciation Committee, H. C. Hasbrouck, *Chairman*, Associated Gas & Electric Co., New York, N. Y.

General Accounting Committee, H. C. Moore, Jr., *Chairman*, New England Gas & Electric Association, Cambridge, Mass., with paper on "The Straight Line Depreciation - Accounting of Telephone Companies," A. B. Crunden, American Telephone & Telegraph Co., New York, N. Y.

Research and Recovery in the Gas Industry

(Continued from page 22)

I know of no other procedure which offers such complete opportunity for the showing of effort and of ensuing benefits by all, as does this. I know of no other procedure which offers such safeguard to all of the interests over which the administrator stands trustee, as does this. I offer consolidated research, in which your organization has already made a splendid beginning, as the most promising road to the recovery and growth of the gas industry. With the powerful support of the elder statesmen, its success will be doubly assured. I hope sincerely that you may approach these heightened opportunities with the confidence that such a development may readily incorporate the principles of evolutional progress which are at the base of all sound recovery and future growth.

LOST

Millions of cubic feet of Illuminating Gas.

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Home Service at the A. G. A. Convention

The Home Service Breakfast, called for 8:30 Wednesday morning, October 12th during the A. G. A. Convention, was well attended by gas company executives, sales managers, representatives of women's magazines and home service directors. 225 people listened to a program presented by Mildred Clark of the Oklahoma Natural Gas Company, presiding as Chairman of the Home Service Committee.

Hugh H. Cuthrell, as Chairman of the Commercial Section, under which the Home Service Committee functions, pointed out three different trends for home service workers to consider.

1. The testing of equipment for performance, as information to pass on to the sales force.
2. The making of sales surveys throughout the field during the usual home service contacts.
3. Service research to find the reasons for the rising costs in service.

A series of short talks on home service activities was presented by five home service directors. A major activity of the Home Service Committee this year has been the assembling of a questionnaire by Helen Smith of the Rochester Gas and Electric Corporation. A printed booklet entitled "Facts and Figures on Home Service Work" was given to all present and Miss Smith summed up some of the major conclusions given in the report.

New trends in home service work are: a more general use of preliminary training courses for new home service girls; widespread work among the general employee groups with special emphasis on salesmen training; direct home service participation in assisting salesmen to complete appliance sales. In the returns, which represented 44% of the total personnel in home service work, it was found that the number of customers reached by home service in those companies was 2,366,187. Today, there are 498 home service departments in gas companies throughout the country, and their directors with their assistants total 1200 women in the work.

Since trade dealer cooperation functions as a well known activity in home service work on the Pacific Coast, Gladys Price of Los Angeles briefly discussed its operation. Since appliance dealers in Los Angeles make 95% of the total range sales, which for the year 1937 amounted to 80,000 ranges, every dealer is urged to request a home call on new appliances sold. Home service departments have also held newspaper cooking schools and have secured the maximum in dealer cooperation.

"Kitchen Parties,—A Plan to Increase Load" was the subject presented by Edna Mohr, Home Service Director of the Pennsylvania Power & Light Co. Miss Mohr stated that the conclusion of experimentation was that the kitchen party for their company was the most effective sales activity devised for use in home service work. It is nothing more than a platform demonstration informally conducted in the kitchen of a new user. It is attended by friends and neighbors of the new user who do not own an automatic range and refrigerator.

Pauline Watson of The Gas Service Company of Topeka, Kansas de-

Home Service Convention Breakfast

Nearly 300 attended the annual Home Service Breakfast held at the Hotel Traymore, Atlantic City, during the American Gas Association convention. Mildred Clark, Chairman of the Home Service Committee, of the Oklahoma Natural Gas Company, presided. Officials of the A.G.A., as well as various home service directors, spoke at the meeting which followed.

scribed home service work over a one year period as "Home Service at Home on The Sales Floor." Miss Watson was representing one of the new people in home service work,—new in the work, and working in a new department.

"Home Service In The CP Range Program" was the assignment given Ruth Soule of The Brooklyn Union Gas Company. Miss Soule described the plan of testing ranges considered for sale, with the idea of insuring customer satisfaction. Technical tests were made, with assistance given from shop men, manufacturers and the sales organization. As the ranges were selected, it was necessary to plan a program to tell the CP story. This involved first, work with employees as well as with the public. The presentation of the CP story for salesmen included a comparison of a CP and a BC range, each connected with a large meter and each presided over by a home service girl. Speed tests of the giant burner, speed of pre-heating, economy of the banked flame, removal of guess work—and in fact, all 22 points, were developed in a dramatic fashion.

GLADYS B. PRICE

Gladys B. Price Chairman Home Service Committee

Gladys B. Price, Home Service Supervisor of the Southern California Gas Company, Los Angeles, California, for the past 6 years, has been appointed Chairman of the Home Service Committee of the American Gas Association for the year 1938-39. Miss Price was graduated from Oregon State College with a B.S. Degree in Home Economics. She taught Home Economics in public schools of Los Angeles, Portland and Seattle and organized the Home Service Department of the Seattle Daily Times. Before joining the Southern California Gas Company, she was Home Service Director for the Central Arizona Light & Power Company from 1929 to 1932.

A.G.A.E.M. Committee on Statistics

The appointment of an Advisory Committee on Statistics for the Association of Gas Appliance and Equipment Manufacturers has been announced by Merrill N. Davis, president of the Association.

The principal functions of the Advisory Committee will be to decide on questions of statistical policy, and determine the kind of statistics to be gathered and disseminated.

H. N. Ramsey, president of the Welsbach Company, of Gloucester City, N. J., will serve as chairman of the committee. The other members are: W. E. Derwent, vice-president, George D. Roper Corporation, Rockford, Ill.; J. S. Drillette, vice-president, Peerless Manufacturing Company, Louisville, Ky.; R. G. Logue, vice-president, Ward Heater Company, Los Angeles, Calif.; H. P. Mueller, president, L. J. Mueller Furnace Company, Milwaukee, Wisc.; F. E. Sellman, vice-president, Servel, Inc., New York, and John Van Norden, secretary, American Meter Company, New York.

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AUDITORIUM
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GAS SERVICE STOPS

SINCE 1869 Hays has built dependable brass products for the Gas Industry. Standard, Special Weight, Heavy Pattern and High Pressure Stops to meet all requirements are manufactured by Hays in a full range of sizes. Write for Catalog No. 4 today.

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ATLANTIC CITY

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Here you will find everything to further your comfort and enjoyment — outside ocean-view rooms . . . sun deck . . . beautiful dining room at the ocean's edge . . . superb cuisine . . . varied sports . . . and entertainment. You'll like your fellow guests . . . and the delightfully friendly atmosphere of The Chelsea

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SPECIAL WEEKLY RATES
WRITE FOR BOOKLET AND INFORMATION

JOEL HILLMAN · J. CHRISTIAN MYERS · JULIAN A. HILLMAN

News of the Industry

Annual Meeting of A.G.A.E.M. Held at Atlantic City

A national sales promotion program for 1939 in behalf of the Certified Performance Gas Range, specifications for which were recently devised by a committee of the gas industry, was adopted by manufacturers of the product, it was announced by W. E. Derwent, of the George D. Roper Corporation, Rockford, Ill., and chairman of the Domestic Gas Range Division of the Association of Gas Appliance and Equipment Manufacturers at the 3rd annual meeting of the Association just held at the Hotel Claridge, in Atlantic City, N. J.

R. S. Agee, sales promotion manager of the Association, said that the cooperative sales, advertising and publicity program for the 1939 project would be worked out in detail within the next few months. He reviewed also results of the 1938 CP promotion campaign launched in September by the Association in conjunction with the American Gas Association's national advertising program.

G. E. Frazer, of Chicago, counsel of the Association, told the gas appliance manufacturers that the most valuable asset of the group was the cooperation of such agencies of distribution as department stores, utilities, plumbers and others. Reviewing the three years existence of the Association he said that the support of these selling and distribution agencies had contributed more than anything else to the progress of gas appliance manufacturers.

F. E. Sellman, of New York, treasurer of the Association and vice-president of Servel, Inc., complimented the membership for its support of the various 1938 sales and advertising campaigns conducted for various divisions of the Association.

Merrill N. Davis, of Bradford, Pa., retiring president of the Association, reported that the members of the Association were joining wholeheartedly in the gas industry's participation in the New York World's Fair in 1939, which, he said, should put the industry to the forefront among industrial exhibitors there. Mr. Davis emphasized the further need of public relations through the use of advertising, publicity and other media.

E. R. Guyer, vice-president of the Cribben & Sexton Company, of Chicago, was installed as the new president of the Association. Frank H. Adams, vice-president of the Surface Combustion Corporation, of Toledo, Ohio, was elected vice-president of the Association. Mr. Sellman was reelected treasurer of the Association.

The members of the new board of directors of the association are: A. P. Brill, Ruud Manufacturing Co., Pittsburgh, Pa.; R. F. Cleary, Homestead Heater Co., Newark, N. J.; Merrill N. Davis, S. R. Dresser Manufacturing Co., Bradford, Pa.; (ex-officio) W. E. Derwent, George D. Roper Corp., Rockford, Ill.; F. J. Fieser, Ensign-Reynolds, Inc., Mt. Vernon, N. Y.; H. J. Johnson, Remington-Rand, Inc., Buffalo, N. Y.; W. P. Hutchinson, Sprague Meter Co., Bridgeport, Conn.; H. N. Ramsey, Welsbach Company, Gloucester City, N. J.; S. E. Little, American Stove Co., Cleveland, O.; R. G. Logue, Ward Heater Company, Ltd., Los Angeles, Cal.; H. P. Mueller, L. J. Mueller Furnace Co., Milwaukee, Wis.; R. L. O'Brien, Detroit Brass & Malleable Works, Detroit, Mich.; J. A. Robertshaw, Robertshaw Thermostat Co., Youngwood, Pa.; W. F. Rockwell, Pittsburgh Equitable Meter Co., Pittsburgh, Pa.; and W. R. Smith, Continental Water Heater Company, Ltd., Los Angeles, Cal.

E. R. Guyer, executive vice-president of the Cribben & Sexton Company, Chicago, Ill., newly-elected president of the Association of Gas Appliance and Equipment Manufacturers, is shown here receiving the congratulations of Merrill N. Davis, of Bradford, Pa., whom he succeeds. The election of officers and directors for the fiscal year 1938-39 was the principal event of the third annual meeting of the A.G.A.E.M. held on October 10 at the Hotel Claridge in Atlantic City.

Charles H. Hughes in Consulting Work

Charles H. Hughes, for many years research engineer and designer of equipment for Semet-Solvay Engineering Corporation, has resigned to establish a consulting engineering service at 270 Broadway, New York. Mr. Hughes is widely known in the by-product coke oven and gas industries for his work in coal carbonization, carbureted water gas and related processes. He is an authority on refractories and their adaptation to special furnace design.

The CP Gas Range News

The October issue (Vol. 1, No. 1) of the CP Gas Range News, published by Association of Gas Appliance & Equipment Manufacturers gives a splendid presentation of the CP Range features and sales program.

Opinions of women's magazine editors are cited, the market possibilities pointed out and attention directed to the "CP Salesmaker" an illustrated manual for salesmen.

Window displays, newspaper mats, bill enclosures, direct mail pieces, banners and novelties for sales campaigns are illustrated, all this and other material being available through A.G.A.E.M.

Copy of this CP Gas Range News will be mailed gratis to any gas company or gas appliance dealer. Address the Association of Gas Appliance and Equipment Manufacturers, 60 East 42nd Street, New York.

Gild of Ancient Suppliers Convenes

One hundred and ten Suppliers and Burghers attended the dinner meeting and it was one of the bright spots of the Convention. Jimmie Green's address was appreciated by everyone. The Ritual went over in a big way and it was the consensus of opinion of those present that the Gild had definitely arrived.

The second Annual Feast of the Gild of Ancient Suppliers was celebrated during the A. G. A. Convention on October 10th at Hotel Madison, Atlantic City. The menu which was calculated to satisfy the epicurean tastes of the gas men assembled is given below. Above are the officers in full regalia. Left to right they are:—J. H. Moore, Clerk; W. G. Gribbel, Alderman; Jno. C. Clark, Alderman; J. A. Messenger, Alderman; C. E. Bartlett, Senior Warden; I. W. Peffly, Sergeant-at-Arms; James E. Green, (Speaker of the Evening); W. S. Guitteau, Mayor; Schuyler MacKenzie, Warden—New England; Jno. J. Bonner, Keeper-of-Treasure; Jos. Mulcare, Warden—New York.

Welcome - Thrice Welcome!

Ye Second Annual Feast
Gild of Ancient Supplers

Hotel Madison, Atlantic City **October 10, 1938**

Ye Catalog thereof:- Superseding Catalog 4-11-44

Illuminants

Drip Oil **Water Gas Tar** **Naphthalene**

Bivalves **A Raw Deal**

B. T. U. **Coke** **Therms**

Gas Oil

Meter Diaphragms

Generator Fuel **Oxide** **Gas Holders**

Inerts **Combustibles**

High Volatile Coals **Blank Flange** **Coal Tar**

NOTE: DIMENSIONS AND SPECIFICATIONS ARE GUARANTEED TO BE EXACTLY AS STATED ABOVE UNLESS THERE SHOULD BE SOME VARIATIONS THEREFROM.

Natural Gas Project

Public Works Administrator Harold L. Ickes announced September 19 approval of grant of $16,650 out of a total estimated cost of $37,000 for a natural gas distribution system at Canton, Kansas. This sum includes acquisition of necessary land and rights of way.

Pittsburgh Water Heater Appoints R. C. Hill General Sales Manager

The Pittsburgh Water Heater Corporation announces the appointment of Mr. Robert C. Hill as its General Sales Manager, effective October 1. The Company's policy of Sales assistance and cooperation extended to the natural, manufactured and liquefied petroleum gas industries, as well as the plumbing trade, is being fortified and strengthened materially.

Mr. Hill brings with him a background of more than fifteen years merchandising experience in the appliance field. He organized and managed the Sales Force on the Westinghouse refrigerators in Metropolitan New York. He was assistant to the Sales Manager of the Philadelphia Electric Company and Suburban Gas and Electric properties, and was Comptroller of all the United Gas and Electric Corporation's properties operating in twenty-three States.

ROBERT C. HILL

He is a strong advocate of cooperation, having been one of the early sponsors of the Electric Industry's cooperative activities. Following a college education, he has taken several specialized courses in merchandising.

Proposed Extention of Gas Mains at St. Petersburg, Fla.

City Manager Glenn V. Leland, St. Petersburg, Fla., states that WPA applications will be filed as fast as local unemployment conditions warrant on a program of city water and gas extensions calling for an outlay of approximately $125,000.

Under the WPA setup the government will furnish the cost of labor and the city the expense of materials. Local federal unemployment agency records will be used as a basis in determining the rapidity with which the projects will be filed. The government's policy is to grant project petitions in proportion to the existing ratios of unemployment.

Proposed gas main extensions include: 3520 feet of 12" inch, 850 feet 8", 15,500 feet 6" and 1100 feet 4" mains.

Northern Indiana Public Service Company Elects Officers

Dean H. Mitchell was elected president of the Northern Indiana Public Service Company at a special meeting of the board of directors of the company on September 22nd. He succeeds John N. Shannahan, who died last month.

His business life spent in the Calumet region, headquarters of Northern Indiana Public Service Company, the new president has been with this and predecessor companies since 1924. He was made vice-president and general manager four years ago next month, after a rapid business advancement.

Acting on Mitchell's recommendation, the board of directors of Northern Indiana Public Service Company also named two new vice-presidents, both of them Hoosier-born graduates of Purdue University, whose only jobs since graduation about fourteen years ago have been with the company of which they now become officers. The vice-president are David L. Bement, who has been general electric superintendent, and E. D. Anderson, who has been service manager. Both came to the company as cadet engineers when they left Purdue.

In announcing their election, Mitchell reiterated his comment made when he promoted them several years ago, to the positions they held prior to today.

"These men, elected vice-presidents because of their outstanding success in their respective fields, have been promoted in line with our policy of recognizing merit within the company," he said. "Their election to vice-presidencies emphasizes the high proportion of key men born and educated in Indiana, and who started their business careers with this company."

Mr. Mitchell is chairman of the accounting section of the American Gas Association and president of the Indiana Gas Association. He is a director in the national organization, and also has been a director in the Indiana Electric Association.

At the same meeting, the directors confirmed the naming of Walter A. McDonough as comptroller of the company, and Fred E. Thacker as secretary-treasurer. Both have been filling these positions for several months.

Republic Steel Announces New Folder for Pipe Users

Republic Steel Corporation has issued a new 10-page bulletin No. 316 entitled "Facts About Republic Standard Pipe," containing bundling tables, sizes and weights, identification and corrosion information on Republic Standard Pipe, Republic Copper-Bearing Steel Pipe and Toncan Copper Molybdenum Iron Pipe. This is a "Handy Andy" folder for pipe users and can be obtained by writing Republic Steel Corporation, Cleveland, Ohio.

A Series of Four Slide Films

The Vocafilm Corporation, in consultation with the American Gas Association and a number of practical operating executives, has prepared a series of four sound slide films on constructive customer relations designed primarily for showing at employee meetings.

Each film is designed to increase the efficiency, courtesy and knowledge of employees. Five major problems common to all operating companies were selected and the answers posed in these four 15-minute sound slide films.

The films are directed to all those who come into contact with the public—meter readers, maintenance gangs, engineers, service men, cashiers, inspectors, telephone operators, information clerks, credit men and salesmen. In fact, all gas company employees.

The Western Newspaper Union which has offices in 34 key cities, will have these pictures and will be glad to show them to any gas company. Further details may be obtained from the Vocafilm Corporation, 424 Madison Avenue, New York.

Blodgett Sales Helps

The Blodgett Oven Co., Burlington, Vermont, announces the compilation of a series of educational and promotional letters containing information and sales helps for gas company and dealer salesmen of heavy duty hotel and restaurant gas appliances.

FOUND

A NEW MARKET FOR GAS

DOMESTIC HUMIDIFICATION WITH THE REPUBLIC HUMIDIFIER

AUTOGAS CORPORATION
CHICAGO ILLINOIS

GENERAL SALES AGENT
REPUBLIC HEATERS SALES CO., CHICAGO

Philadelphia Electric Company Elects H. B. Bryans Executive V. P.

Henry B. Bryans was elected executive vice-president of the Philadelphia Electric Company at a meeting of the Board of Directors held October 25. He has been vice-president in charge of operations of the company since 1929 and has been identified with the operation and management of electric and gas utilities for many years.

HENRY B. BRYANS

Mr. Bryans was born in Philadelphia and graduated from the University of Pennsylvania in 1907, taking his degree in mechanical engineering.

During his university course and for several years thereafter he was employed in various capacities in the distribution department of The Philadelphia Gas Works Company. On January 1, 1909, he went to the Kansas City Gas Company in Kansas City, Missouri.

He returned in 1912 to Philadelphia, where he inspected and appraised gas and electric properties for The United Gas Improvement Company. In 1914 he was appointed engineer of the Counties Gas and Electric Company at Norristown, where his principal attention was directed to developing electrical facilities in line with the notable expansion then characteristic of the industry as a whole. At the same time he carried on various other engineering, operating and sales activities. In 1927 he was made general superintendent of the Philadelphia Suburban-Counties Gas and Electric Company and in the following year was promoted to assistant general manager of the same company.

He has been with the Philadelphia Electric Company since 1928, successively as assistant general manager and vice-president in charge of operations.

E. W. Williamson Tendered Dinner on Retirement

Officials of Standard Oil companies from New York went to Pittsburgh, Oct. 27th to attend a dinner in honor of E. W. Williamson, manager of The Peoples Natural Gas Company, who retired Nov. 1, after 42 years of service.

E. W. WILLIAMSON

Retired officials present were J. B. Tonkin, former president, and R. D. Beardsley, former treasurer, of The Peoples Natural Gas Company.

Five other employees of The Peoples Natural Gas Company who retired Nov. 1 are: F. W. Dierst, electrician; J. J. Balzer, blacksmith; H. T. Foley, telegraph department; Edgar Ludwick, engineer; and George Fonner, district superintendent.

Mr. Williamson, when he was 17, went to work as a messenger boy for the Ohio River Railroad, now a part of the Baltimore and Ohio. He became a telegraph operator. In 1896 he took his first job in the natural gas industry as a telegrapher for the Mountain State Gas Company at Schultz, W. Va. In 1904 he was transferred to the River Gas Company at Marietta, O., where he gave his whole time to financial responsibilities. In 1906, he was made assistant superintendent of the Mountain State Gas Company. He became superintendent in 1910. The same year he was transferred to the Hope Natural Gas Company as division superintendent of the Mountain State division and River Gas Company, with his headquarters in Parkersburg, W. Va.

Mr. Williamson was transferred to The Peoples Natural Gas Company at Pittsburgh in 1919 and the same year was made assistant general manager of the company. He was made manager in 1934.

L. H. Spiner with Laclede Gas Light Co.

In keeping with the policy of local management for The Laclede Gas Light Company, L. Wade Childress, president, has announced the appointment of L. H. Spiner as executive assistant and the promotion of Alfred Hirsh to the position of assistant to the president.

L. H. SPINER

In announcing these appointments Mr. Childress called attention to the local character of Laclede's management today, which includes the following prominent St. Louisans on the Board of Directors: W. C. D'Arcy, W. K. Koerner, E. E. Pershall, B. F. Pickard, A. W. Shapleigh, and E. L. White. Messrs. D'Arcy, Pershall, Shapleigh, and Childress are also members of the executive committee.

Mr. Spiner was formerly Director of Sales Promotion, Advertising and Merchandising for the Shell Petroleum Corporation, resigning that position on August 1.

Prior to joining Shell, Mr. Spiner had a broad sales and administrative background, which included pioneering of the truck and tractor field, the management of a Construction Company, a Sales Promotion Organization, and a Finance Corporation. As a pilot in the Army Air Service during the World War, he served first as instructor and later as a test pilot. Spiner attended the Universities of Ohio and California.

Mr. Hirsh is one of Laclede's oldest employees in terms of service, although he is now but 45 years old. He joined the Company in 1908 as a messenger. Recently his duties were broadened to Asst. Secretary-Asst. Treasurer, an elective position, which he will retain on assumption of his new duties as Assistant to the President.

Central States Power & Light Co. Executive Office Moves to St. Louis

Ben F. Pickard, who was vice president and general manager of the Laclede Gas Light Company since December, 1936, recently resigned from that company in order to devote his entire time to the Central States Power & Light Corporation of which he is president.

Mr. Pickard further announced that the executive, administrative, engineering, purchasing and budgeting department of the Central States Company will be moved from Tulsa, Oklahoma, to St. Louis, and that offices will be established in the Laclede Gas Building, in November.

INDUSTRIAL GAS BOILERS

Tubular or Flueless

¾ to 45 H.P.

P. M. LATTNER MFG. COMPANY

CEDAR RAPIDS, IOWA

O'Connor Elected Director S. R. Dresser Mfg. Co.

Mr. J. B. O'Connor, Vice President and General Sales Manager, Clark Bros. Company, Olean, N. Y., has been elected to the Board of Directors of S. R. Dresser Manufacturing Company, Bradford, Pa., according to a recent announcement by H. N. Mallon, President.

J. B. O'CONNOR

Mr. O'Connor has been associated with Clark Bros. since 1927, entering the firm as sales representative, and later advancing to the position he now holds. Clark Bros. are well-known manufacturers of gas engines and compressors. S. R. Dresser Manufacturing Company, the parent company, manufactures Dresser pipe couplings and pipe-line repair devices.

American Bosch, New Title

At a special meeting held on September 26th at the Company's New York Office, stockholders of the United American Bosch Corporation voted to change the name of the Corporation to American Bosch Corporation, and to change authorized capital stock to 750,000 shares of par value $1.00 per share.

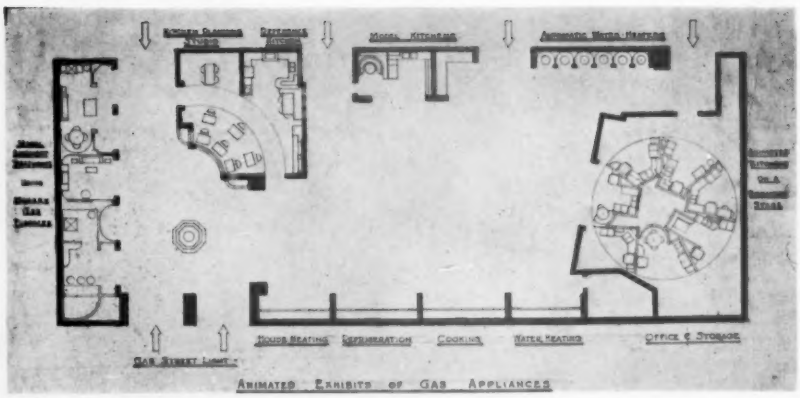
Announcement is also made that Mr. W. G. Bode has been appointed Manager of Export Sales.

Mr. Bode has been connected with the American-Bosch sales organization since 1926, during which time he has served in various important executive capacities.

Indiana Utility Notes

The Indiana public service commission has approved the petition of the Northern Indiana Power Company to substitute natural gas for artificial gas at Huntington, Ind. The commission recently held a hearing on the petition, in which the mayor, C. W. H. Bangs opposed the transfer. As a result of the order, the minimum rate was raised from 50 cents to $1 a month. Officials of the company, however, said the change would result in a decrease in average rates.

H. Carl Wolf, president of the Central Indiana Gas Company, Muncie, Ind., has announced his acceptance of the presidency of the Atlanta (Ga.) Gas Light Company, effective immediately. He will be succeeded here by Guy T. Henry, vice president of the Roanoke (Va.) Gas and Light Company. Mr. Wolf is a past president of the Indiana Gas Association, which he still serves as a director.



Cooperative Gas Exhibit, Golden Gate International Exposition

Construction of the Cooperative Gas Exhibit, sponsored by the Pacific Coast Gas Association, at the Golden Gate International Exposition, is actively under way. The accompanying photograph illustrates the general floor plan of the exhibit.

The exhibit occupies some 10,000 sq. ft. of floor space in the Homes and Gardens Building extending the entire width of the building at its West end. The main entrance of the building opens directly into the exhibit.

One of the main exhibit features is a revolving stage concealed behind the facade of a Spanish bungalow. A large window in the bungalow will open at three- or four-minute intervals and each opening will reveal an attractive modern kitchen in each of which there will be an individual manufacturer's newest gas range. Also featured in the kitchens will be an Electrolux refrigerator and in some cases a water heater. Each kitchen display will be accompanied by animation of the appliances and a syncronized demonstration by voice and picture. There will be six individual kitchens in the display and one service room in which water heating and house heating particularly will be demonstrated.

Along one side of the patio will be three other kitchens, two of them being built by Whitehead Metal Products Company featuring Monel Metal kitchen equipment and the other a demonstration kitchen adjacent to a home planning bureau manned by expert designers. On this side also will be individual and collective exhibits of participating water heater manufacturers. Across the patio are four animated displays each illustrating one of the four big jobs gas does in the home. The appliances of all participating manufacturers will be rotated in these floor displays and kitchens.

Across the aisle and next to the main entrance of the building will be the house heating display. Furnaces will be set in attractive rumpus rooms and basements, and the piping installation will illustrate the method of heating both downstairs and upstairs rooms.

The financing, construction and operation of the exhibit is being handled by the Pacific Coast Gas Association through a special committee composed of R. E. Fisher, Chairman, H. R. Basford, H. L. Farrar, Don Fleming, E. J. Hinchey and R. A. Hornby. L. E. Lindsay, Display Manager of Seattle Gas Company, is the exhibit's designer, construction work being contracted to the Heinsbergen Decorating Company of San Francisco and Los Angeles. Financing has been arranged jointly by utilities and manufacturers, contributors to the fund which totals close to $150,000 being as follows:

Participants in the Exposition are:

Utilities: Central Arizona Light and Power Company, Coast Counties Gas and Electric Company, El Paso Natural Gas Company, Honolulu Gas Company, Pacific Gas and Electric Company, Portland Gas and Coke Company, Republic Electric Power Company, San Joaquin Light and Power Corp., Santa Maria Gas Company, Seattle Gas Company, Sierra Pacific Power Company, Southern California Gas Company, Southern Counties Gas Company.

Equipment Firms: American Brass Company, American Meter Company, Art Concrete Works, S. R. Dresser Company, Merco Nordstrom Valve Company, Grayson Heat Control, Ltd., Mueller Company, Pittsburgh-Equitable Meter Company, Sprague Meter Company, Reliance Regulator Corporation.

Heating Manufacturers: Pacific Gas Radiator Company, Payne Furnace & Supply Company, Ward Heater Company.

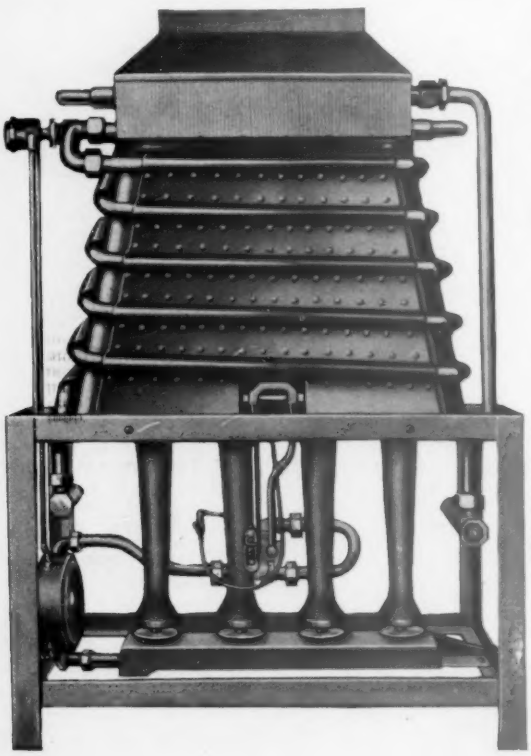
Range Manufacturers: American Stove Company, Cribben & Secton Company, Gaffers & Sattler Company, Jas. Graham Manufacturing Company, Hammer-Bray Company, Geo. D. Roper Corporation.

Refrigerators: Servel, Inc.

Water Heater Manufacturers: Continental Water Heater Company, Day & Night Water Heater Company, General Water Heater Corporation, Hoyt Heater Company of No. Calif., Mission Water Heater Company, Ruud Manufacturing Company, Merit Water Heater Company, Ltd., Welsbach Company.

"Pittsburg" Gas Fired Heating System

A new development in house heating has just been introduced by Pittsburgh Water Heater Corporation of Pittsburgh, Pa. The unit shown herewith is designed to provide radiation up to 555 square feet, ratings being figured on a maximum heat transmission of 150 Btu. per hour per square foot of direct cast iron radiation.



With a closed system and forced circulation employed in this unit, the manufacturers claim instant and constant heat and that in a house of 5 or 6 rooms with the proper type of radiators, the entire water in the system passes through the heater every three minutes.

These units, housed in attractive black and green jackets are reasonably priced and occupy but limited floor space. Equipped with controls which keep an even temperature at the radiators at all times and maintain proper room temperature. Bulletin on request.

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Oil Gas Plants—"Refractory Screen" Process for Base—Standby or Peak Loads—On Existing or New Water Gas Sets Low or High B.T.U. Gas

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AMBLER, PA.

GAS HOLDERS

HOLDER INSPECTION

RIVETED OR WELDED FABRICATION & ERECTION

TANKS, BINS, FLUES PURIFIERS, WELDINGS

WIDE POWER RANGE

Connelly Type LC District Regulator

Note these outstanding features of the Connelly Type LC Regulator: Adjustable linkages connect diaphragm and valve stem, providing a power ratio adjustable to any requirement within limits of the design.

Fluctuations in inlet pressure do not affect functioning.

By removing cover plate from large opening in side of valve body, balanced valves and seat are easily accessible.

Bulletin No. 200-B-1 gives table of power ratios.

CONNELLY
IRON SPONGE AND GOVERNOR CO.
Chicago, Ill. Elizabeth, N. J.

Rate Trends

(Continued from page 26)

frigeration and if the service is satisfactory I may heat my house with it. What will it cost me to do those jobs?"

"Well Mr. Customer, I know the gas business and I think I know how much gas you'll use for those various jobs. However, there is so much variation between you and your neighbors that I'd hate to hazard a guess as to how much it will cost you specifically. Tell you what I'll do—I'll sell you the small quantity of gas you'll need in the apartment at a price that will be less than its value to you measured in terms of its convenience and all, but I'll have to charge you a pretty high rate for that small quantity. Later on when you get ready to have me take on those other jobs I'll make you a real price on them—each additional job I take on will cost you less and less."

"Go ahead, Mr. Rate, connect up my apartment and I'll think about the other. I did hope you could give me a little more definite information about it. My trouble has always been that I didn't understand heat values and cubic feet and all that stuff in your rates. Why can't you make me a rate based on the things I do know about—meals to be cooked, water to be heated, rooms to be heated, etc."

And why can't we? Perhaps we can at some not too distant date. If you'll read this report you'll find a suggestion for doing that very thing for commercial and industrial customers—from there to the domestic customer is just a step.

A study of these tables from the customer's standpoint will show that we've come a long way on the road of what we may call "human rate making." Much remains to be done. Our rate makers must be imbued with the customer's viewpoint. They must adopt the customer's psychology. Our salesmen must be equipped not only with persuasive sales arguments but with rates that make the customer want to buy—not have to be sold; rates that look familiar to him—not rates that have to be explained and explained—and then leave the customer sceptical.

It remains for future Rate Committees to lead us farther and farther along that path, which should lead eventually to complete understanding and harmony between the company and the customer. To where we will say:

"To meet the needs of *your* business I have designed this rate. It is expressed in *your* language."

Geophysical Methods of Exploration

(Continued from page 30)

Among the notable geophysically located oil and gas fields of the United States are the Iowa, Lafitte, English Bayou-Gillis, Anahuac, Hastings, Thompsons and Tomoconnor in the Gulf Coast region, and Monument field in New Mexico. Geophysics has accounted for from 20 to 25% of the total oil reserve of the United States. With the total oil reserve running close to 16,000,000,000 barrels, geophysics has handsomely paid for itself.

The future of geophysics depends strictly on the future of the oil business. As long as oil is needed, so long will geophysics have a place and render service. It has made such startling advances in the past, it can only be hoped that it will do so again in the future. At the present moment, however, there is ample need for continued geophysics and ample unexplored territory for examination.

A more nearly complete discussion of technical progress in oil exploration over the last quarter century is included in a report entitled, "Technology, Employment, and Output Per Man in Oil and Gas Production," now in preparation by the National Research Project—WPA in cooperation with the United States Bureau of Mines. The author collaborated in preparing the section of this report on oil exploration and is indebted to the directors of the study for permission to present these diagrams which are preliminary and subject to revision.

Steam as a Purging Agent

(Continued from page 51)

within the equipment under existing conditions. When the fraction of oil in the condensed oil-water mixture has been reduced to 5% of the total oil-water mixture, the vapor volume samples will contain less than 1% oil vapor which is the minimum lower explosive limit for industrial oils. The rate of vaporization of oil is fixed by its vapor pressure and temperature, but the rate at which the oil vapor is removed depends upon the rate of flow of the purge steam. Thus the proportion of oil vapor in the purged mixture is less and less as the steam rate is increased. A low fraction of oil in the condensed sample may indicate an excessive rate of steaming. For this reason the steam rate is progressively reduced by stages, and the proportion of oil in the condensed mixture measured. If the proportion of oil in the condensed oil-water mixture increases to above 5%, it indicates that the oil in the equipment has not been reduced to the required minimum. Therefore, purging is continued until the oil in the condensed samples shows no tendency to increase above 5%, even when the steaming rate has been reduced to a minimum required to maintain a slight pressure in the equipment. As long as the fraction of the oil remains below 5% during these operations, the amount of oil vapor present in the equipment is less than 1% of the mixture which is the minimum lower explosive limit for industrial oils and represents the safe endpoint in steam purging.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY HE ACT OF CONGRESS OF AUGUST 24, 1912, of American Gas Journal, published monthly at East Stroudsburg, Pa., for September, 1938.

State of New York }
County of New York } ss.

Before me, a Notary Public in and for the State and county aforesaid, personally appeared S. G. Krake, who, having been duly sworn according to law, deposes and says that he is the Manager of the American Gas Journal and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation) etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor and business managers are: Publisher, American Gas Journal, Inc., 53 Park Place, New York City; Editor, Alfred I. Phillips, 53 Park Place, New York City; Business Manager, H. T. Matthew, 53 Park Place, New York City.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.) S. G. Krake, 53 Park Place, New York City.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company, but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom said trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the six months preceding the date shown above is ———. (This information is required from daily publications only.)

S. G. KRAKE,
Manager

Sworn to and subscribed before me this 27th day of September, 1938.

(Seal) MARY E. KELLEHER.
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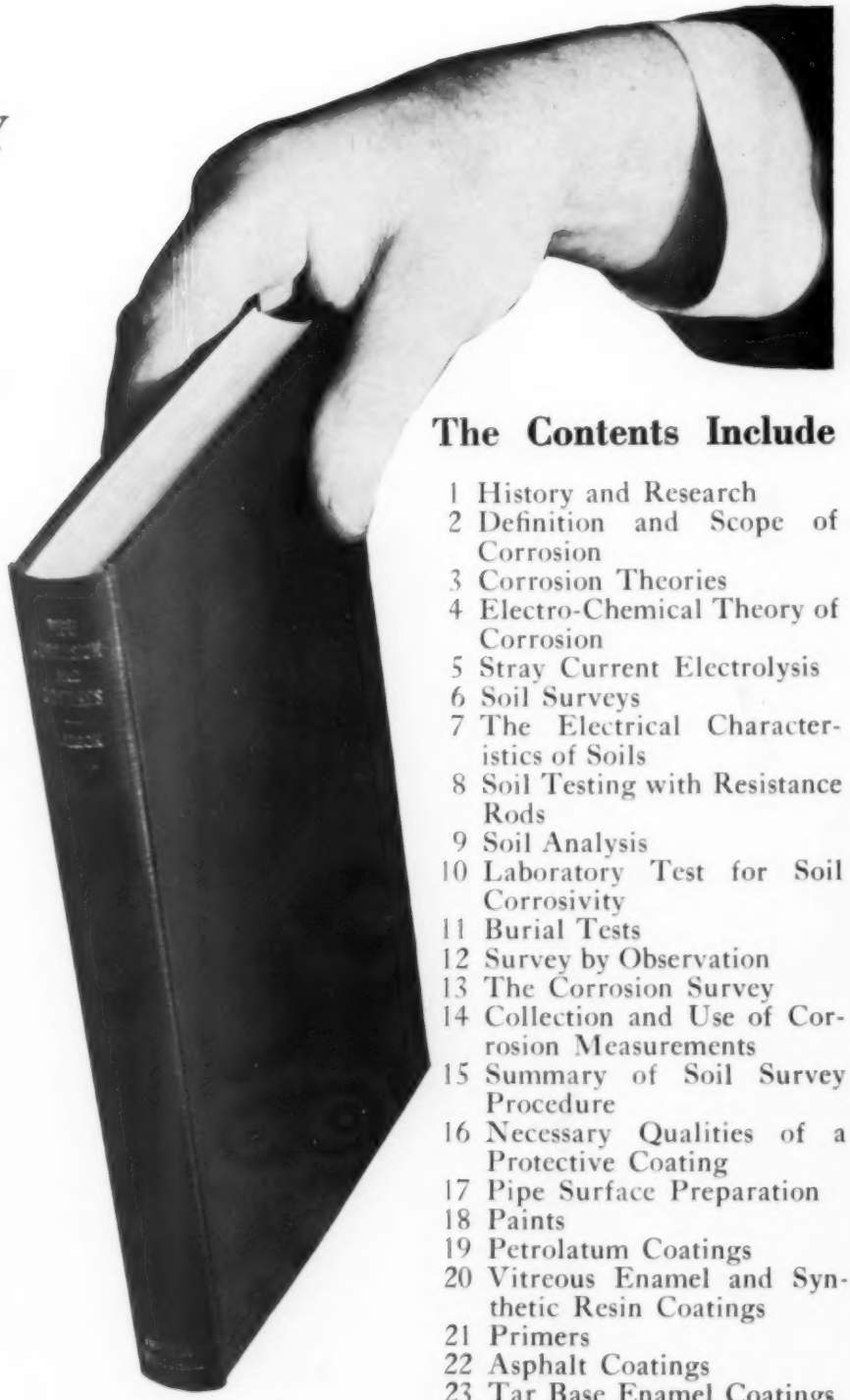

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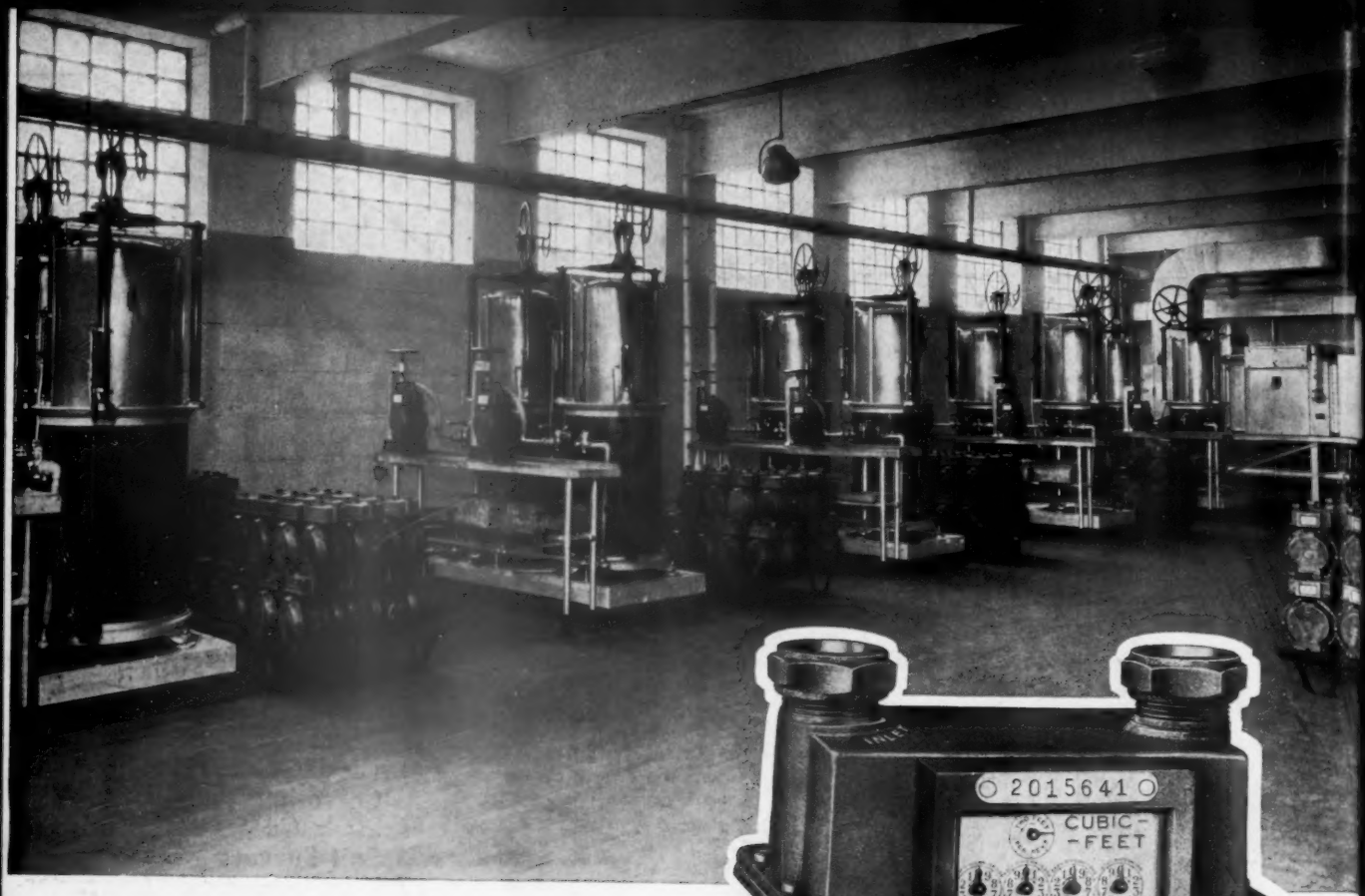
Modern Proving of Gas Meters



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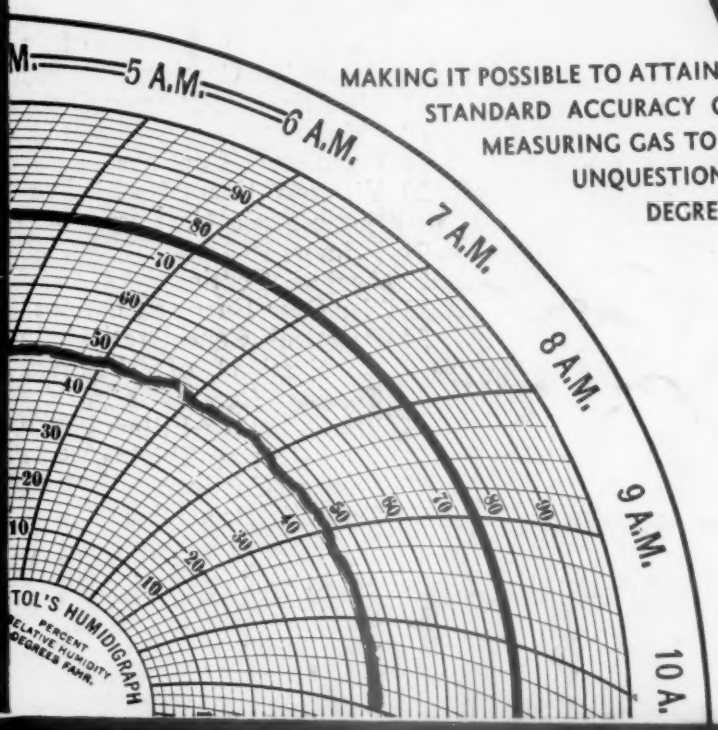

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